17. Climate

17.1 Introduction

As set out in Chapter 1 of this updated EIAR, this is an update to the climate assessment of the EIAR submitted to An Bord Pleanála in October 2018 as part of the application for approval of the proposed N6 GCRR pursuant to Section 51 of the Roads Act 1993 (as amended). The topic of climate is now covered in Chapter 17, a standalone chapter in this updated EIAR.

It forms part of the response to the request by ABP for further information in December 2023 where ABP (in addition to a number of other requests) requested GCC to "*Update the Environmental Impact Assessment Report*".

This chapter provides an appraisal of the Project under the heading of climate. there have been changes to the assessment and or updates since the 2018 EIAR these have been set out in this updated chapter.

The assessment of effects on climate during the construction phase considers the embodied carbon associated with likely materials to be used and emissions from construction phase traffic.

The assessment of effects on climate during the operational phase is considered by comparing CO_{2eq} (carbon dioxide equivalence) emissions from traffic in a Do-Minimum scenario (without the Project) to a Do-Something scenario (with the Project) for the opening and design years in accordance with EIA legislation and guidance. Potential operational phase CO_{2eq} emissions are also quantified due to embodied carbon associated with the maintenance of the Project.

This chapter initially sets out the methodology followed (Section 17.2), describes the receiving environment (Section 0), and summarises the main characteristics of the Project which are of relevance to climate (Section 17.4). The evaluation of effects of the Project on climate are described (Section 17.5), measures are proposed to mitigate these effects (Section 17.6), residual effects are described (Section 17.7) and cumulative effects of the Project in combination with other planned and committed projects are described (Section 17.8).

A separate assessment is included in Section 17.9 which considers the approach described in the EU Commission 'Technical guidance on the climate proofing of infrastructure in the period 2021-2027'. In addition, a summary of the assessment in response to the ABP request for '*submissions in relation to the most recent Climate Action* Plan', is summarised in Section 17.8 and an assessment relative to the matters specified in Section 15 of the Climate Act is provided in Section 17.9.

The chapter concludes with a summary (Section 17.12) and reference section (Section 17.13).

17.2 Methodology

17.2.1 Introduction

The following section identifies the regulations, legislation and/or guidelines available and based on the foregoing, the adopted methodology in the preparation of this chapter.

17.2.2 Regulations, Legislation and/ or Guidance

17.2.2.1 Introduction

As set out in Chapter 2 of this updated EIAR, there have been significant changes since 2018 with respect to addressing climate change in Ireland with the passing of the Climate Action and Low Carbon Development (Amendment) Act 2021 which effected substantial amendments to the Climate Action and Low Carbon Development Act 2015 (the Climate Action and Low Carbon Development Act 2015 as amended is referred to hereafter as the "Climate Act") and the subsequent agreement of legally binding carbon budgets and sectoral emissions by the Government in 2022. Transport Infrastructure Ireland (TII) developed a new standard for assessment of climate impacts to ensure the transport sector is aligned with delivery of Ireland's climate action ambitions. This standard *Climate Assessment of Proposed National Roads – Standard (PE-*

ENV-01105) (2022) (TII Climate Standard) has been applied in the assessment of potential climatic impacts, alongside the *Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) - Overarching Technical Document PE-ENV-01104 (2022)*.

The potential effects of emissions of carbon due to the construction and operation of the Project have been considered in the context of Ireland's energy carbon budget. The climate assessment for the construction phase estimates the potential for greenhouse gas (GHG) emissions, i.e., CO_{2eq}, for the Project.

EU greenhouse gas emission reduction targets and reduction obligations for Ireland are split into two broad categories. The first category covers the large energy and power (i.e., energy intensive) industry which have their emissions controlled under the EU Emissions Trading Scheme (ETS). The second category deals with the non-Emissions Trading Scheme (non-ETS) sectors such as agriculture, transport, residential, commercial, waste, and non-energy intensive industry. The proposed Project, as a transport project, is considered in terms of non-ETS.

However, in accordance with the TII Climate Standard, Ireland's carbon budgets should be used to contextualise the magnitude of GHG emissions from the Project, during both construction and operational phases. The carbon budgets relate to electricity, transport and industry so are considered representative of potential GHG emissions from the Project.

The sources and life cycle stages of likely GHG emissions are provided in Table 17.1 from the TII Overarching Technical Document. It should be noted that this standard relates to National Roads, Light Rail, and Rural Cycleways so all elements may not be directly relevant to the proposed Project.

Table 17.1 Lifecycle Stages and Emission Sources (Source TII, 2022)

Lifestyle Stage	Reporting Category	Description	Primary Emissions Sources
Before Use	Embodied Carbon	Raw material extraction, transportation (within the supply chain up to the point of final factory gate) and manufacturing of products required for the proposed project	Embodied carbon (GHG emissions) within the construction materials
	Transport	Transportation of products/materials and construction equipment from point of production/storage to construction site	Fuel consumed for material and plant transportation to construction site
		Transport to works site	Fuel consumed for worker commuting to and from the construction site
	Construction Processes	Temporary works, ground works, and landscaping	Clearance/demolition activities (including the area of land to be cleared, vegetation/sequestration loss and water use). All advanced works for example archaeological works, fencing etc., should be included. All ground works including earthworks material, laying and compaction etc.
		Excavation	GHG emissions from the excavation of material
		On site energy use	Grid electricity to power auxiliary facilities
			Fuel consumed by construction vehicles and plant
		On site water use	GHG emissions from provision of water and treatment of wastewater

Lifestyle Stage	Reporting Category	Description	Primary Emissions Sources
		Waste production, transportation and waste management	GHG emissions from the treatment of waste
Use	Material Use	Carbon emitted or sequestered directly from the fabric of products and materials once they have been installed as part of infrastructure and it is in normal use	GHG emissions savings arising from planting of different vegetation types and/or rehabilitation activities e.g. peat restoration. For maturing vegetation such as trees, sequestration should be accounted for as the vegetation matures (e.g., <30 years) and once matured (e.g., >30 years)
	Maintenance	Maintenance and repair activities	GHG emissions from energy and fuel use, maintenance vehicles, provision of water and treatment of wastewater during maintenance
			Embodied emissions associated with maintenance and repair e.g. rail/steel replacement and resurfacing materials
	Operation	Operational energy (B6)	GHG emissions resulting from the consumption of energy and fuel use for infrastructure operation e.g. lighting, signage, Luas stops
		Operational water (B7)	GHG emissions resulting from the consumption of water
		Other operational processes (B8)	Other could include GHG emissions as a result of management of operational waste
	User Emissions	User's utilisation of infrastructure	Light Rail energy use. Tailpipe emissions from vehicle journeys
End of Life	Deconstruction	Onsite activities involved in deconstructing, dismantling and demolishing the infrastructure	GHG emissions from vehicles and fuel use for generators on site
	Transport	Transport to and from disposal	GHG emissions from the fuel consumed for worker(s) commuting to and from the site
	Waste processing for recovery and disposal (C4)	Reuse, recycling, and recovery of materials Disposal of materials	Activities associated with treatment and processing for recovery, reuse and recycling of waste materials arising from infrastructure
			GHG emissions resulting from final disposal of demolition materials
Supplementary information beyond the infrastructure lifecycle	Lifecycle benefits and loads beyond the system boundary	GHG emissions potential of reuse and recycling Benefits and loads of additional infrastructure functions	Offsetting carbon emissions of a scheme through credible offsite renewable, planting, rehabilitation and regenerative schemes

17.2.2.3 International

The Paris Agreement (United Nations Framework Convention on Climate Change, UNFCCC 2015), which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C (degrees Celsius) above pre-industrial levels but making efforts to limit this rise to 1.5°C. Nationally determined contributions (NDCs) are at the heart of the Paris Agreement and the achievement of these long-term goals. NDCs comprise the efforts and actions by each country to reduce national emissions and adapt to the impacts of climate change. The Paris Agreement requires each country to prepare the NDCs that it intends to achieve, updating and enhancing the NDCs every 5 years to enable a global stocktake which will assess the collective progress toward the meeting of the purpose of the Agreement. Countries are required to implement mitigation measures, with the aim of achieving the objectives of such contributions. Each of the EU Member States submit their own NDCs, which contribute to the overall EU NDC.

The European Green Deal, published by the European Commission in December 2019, provides an action plan which aims for the EU to be climate neutral by 2050. The EU Green Deal highlights that further decarbonisation of the energy sector is critical to reach climate objectives in 2030 and 2050. The European Green Deal will increase the GHG emissions reduction 2030 target to at least 55% in comparison to 1990 levels. Targets for renewable energy and energy efficiency are also likely to be increased.

On 14 July 2021, the European Commission adopted a series of legislative proposals setting out how it intends to achieve climate neutrality in the EU by 2050, including the intermediate target of at least a 55% net reduction in greenhouse gas emissions by 2030. The package of proposals is known as the 'Fit for 55' package. The package includes revisions to the legislation put forward as part of the Climate and Energy Framework 2021-2030, including the EU Emissions Trading System (ETS), Effort Sharing Regulation, transport and land use legislation, setting out in real terms the ways in which the Commission intends to reach EU climate targets under the European Green Deal.

The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS scheme and thus includes GHG emissions from transport, residential and commercial buildings and agriculture.

The European Climate Law aims to write into law the goal set out in the European Green Deal, for Europe's economy and society to become climate-neutral by 2050. On 17 September 2020, the Commission adopted a proposal to include a revised EU emissions reduction target of at least 55% by 2030 as part of the European Climate Law. In 2023, the Commission issued a new Effort Sharing Regulation, requiring Ireland to reduce non-ETS carbon emissions by 42% relative to 2005 levels.

In February 2024, the European Commission presented its assessment for a 2040 climate target for the EU. The Commission recommended reducing the EU's net greenhouse gas emissions by 90% by 2040 relative to 1990. The 2040 climate target reaffirms the EU's determination to tackle climate change and to ensure the EU reaches climate neutrality by 2050.

Passenger cars and light commercial vehicles (vans) are respectively responsible for around 16% and 3% of total EU emissions of CO_{2eq} respectively. To help reduce emissions, Regulation (EU) 2019/631 sets CO_{2eq} emission performance standards for new passenger cars and vans. On 19 April 2023, the EU amended the Regulation to strengthen the CO_{2eq} emission performance standards for new passenger cars and vans, and bring them in line with the EU's ambition to reach climate neutrality by 2050. This amendment strengthened the emission targets applying from 2030 and set a 100% emission reduction target for both cars and vans from 2035 onwards.

EU Regulation 2019/1242 sets emission standards for heavy-duty vehicles. This Regulation entered into force on 14 August 2019. As per the Regulation, from 2025 onwards, manufacturers will have to meet the targets set for the fleet-wide average CO_{2eq} emissions of their new lorries registered in a given calendar year. Stricter targets will start applying from 2030 on.

The 2021 EU Strategy on Adaptation to Climate Change sets out the pathway to prepare for the unavoidable impacts of climate change. The aim is that "*by 2050, when we aim to have reached climate neutrality, we will have reinforced adaptive capacity and minimised vulnerability to climate impacts…"* Adaptation refers to measures that can reduce the negative impact of climate change by, for example, ensuring a project is resilient to future increases in storm frequency and rainfall levels.

17.2.2.4 National

In 2015, the Climate Action and Low Carbon Development Act, 2015 was enacted by the Houses of the Oireachtas. The purpose of this 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'. This is referred to in the Climate Act as the 'national transition objective'. The Climate Act allows for the submission of an adaptation framework for Ireland referred to as the 'National Adaptation Framework', which is required to be submitted to Government for approval every five years.

The Climate Action and Low Carbon Development Act, 2015 was significantly amended and strengthened by the Climate Action and Low Carbon Development (Amendment) Act 2021. As amended, it commits Ireland to moving to a climate resilient and climate neutral economy by 2050 in alignment with the European Green Deal, and includes the following elements:

- Establishes a 2050 emissions target
- Introduces a system of successive 5-year, economy-wide carbon budgets. The first two carbon budgets covering the periods 2021-2025 and 2026-2030 were announced by the Climate Change Advisory Council in 2021 (with a provisional budget from 2031). Once adopted by the Oireachtas, the carbon budgets will be used to prepare sectoral emissions ceilings for relevant sectors of the economy
- Strengthens the role of the Climate Change Advisory Council in proposing carbon budgets
- Introduces a requirement to annually revise the Climate Action Plan and prepare a National Long Term Climate Action Strategy at least every decade
- Introduces a requirement for all Local Authorities to prepare individual Climate Action Plans which will include both mitigation and adaptation measures

Section 15 of the Climate Act requires that a relevant body (An Bord Pleanala in this case) must, "*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.

The draft Climate Action Plan 2024 (CAP24) was agreed by Government on 20 December 2023 and, following the completion of Strategic Environmental Assessment, Appropriate Assessment, and a six-week public consultation, the finalised version of CAP24 was approved by Government on 21 May 2024. Therefore, CAP24 is the most recent approved Climate Action Plan for the purposes of Section 15 of the Climate Act. Should CAP25 be approved before consent for the Project is granted, then that will be the most recent approved CAP for the purposes of Section 15.

As mentioned above, although it does not form part of the climate assessment for EIA purposes, an assessment of the consistency of the Project with all of the matters specified in Section 15 of the Climate Act, including the most recent approved climate action plan, CAP24, is provided in the 'Obligations under Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended) and submissions in relation to the Climate Action Plan 2024' Report prepared in response to the RFI from ABP.

CAP24 is the third annual update to Ireland's Climate Action Plan, following the introduction of the Climate Action Plan 2023 in December 2022, the Climate Action Plan 2021 in November 2021, and the Climate Action Plan 2019, which was Ireland's first Climate Action Plan, in June 2019.

The purpose of the Climate Action Plan is to lay out a roadmap of actions which will ultimately lead to the State meeting the national climate objective of pursuing and achieving, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral

economy. It aligns with the legally binding economy-wide carbon budgets and sectoral emissions ceilings that were agreed by Government in July 2022.

The carbon budgets as required by the Climate Act comprise of three successive 5-year budgets. The total emissions allowed under each budget is set out below in Table 17.2 as well as the average annual reduction for each 5-year period.

Table 17.2 2021 – 2035 Carbon Budgets (Source: Gov.ie)

Period	Mt CO_{2eq}	Emission Reduction Target
2021 - 2025	295 Mt CO_{2eq}	Reduction in emissions of 4.8% per annum for the first budget period
2026 - 2030	200 Mt CO_{2eq}	Reduction in emissions of 8.3% per annum for the second budget period
2031 - 2035	151 Mt CO_{2eq}	Reduction in emissions of 3.5% per annum for the third provisional budget

The Sectoral Emission Ceilings for each Sector, published in July 2022, is shown in Table 17.3. It should be noted that 5.25 $MtCO_{2eq}$ of annual emissions reductions are currently unallocated on an economy-wide basis for the second carbon budget period (2026-2030). These will be allocated following a mid-term review and identification of additional abatement measures. It is noted that the transport sector is required to reduce emissions by 50% by 2030 relative to 2018 emissions.

Table 17.3 Sectoral Emission Ceilings (Source: Gov.ie)

Sector	Reduction Required	2018 Emissions ($MtCO_{2eq}$)	2030 Emission Ceiling ($MtCO_{2eq}$)
Electricity	75%	10.5	3
Transport	50%	12	6
Buildings (Commercial and Public)	45%	2	1
Buildings (Residential)	40%	7	4
Industry	35%	7	4
Agriculture	25%	23	17.25
Other*	50%	2	1

* = F-gases, Petroleum Refining and Waste

Ireland's second statutory National Adaptation Framework (NAF) was published on 5 June 2024. This latest NAF replaces the first iteration of the framework published in 2018, which was reviewed in 2022 in line with the five-year requirement of the Climate Act, and is the most recent approved National Adaptation Framework for the purposes of the Climate Act.

The NAF sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. Building on the progress made under first NAF, the new NAF outlines a whole of government and society approach to climate adaptation in Ireland. It takes account of developments since 2018 in areas of climate policy, research, sectoral and local adaptation planning, as well as on the recommendations made following the statutory 2022 NAF review.

Ireland has also developed a number of Sectoral Adaption Plans under the National Adaption Framework, which outline how the different sectors must prepare for and adapt to the risks associated with climate change. The Transport Climate Change Sectoral Adaptation Plan (SAP) was published in 2019 and is the most recent approved SAP relevant to the Project at the time of writing. The overarching goal of transport adaptation planning, as set out in the SAP, is to "*ensure that the sector can fulfil its continuing economic, social and environmental objectives by ensuring that transport infrastructure is safeguarded from the impacts of climate change".*

Ireland's Long-Term Strategy on Greenhouse Gas Emissions Reduction 2024 is the most recent approved National Long Term Climate Action Strategy for the purposes of Section 15 of the Climate Act, as amended. It sets out indicative pathways, beyond 2030, towards achieving carbon neutrality for Ireland by 2050. The Strategy provides a pathway to a whole-of-society transformation and links shorter-term Climate Action Plans and Carbon Budgets, and the longer-term objective of the European Climate Law and Ireland's National Climate Objective. The Strategy reiterates the need to substantially accelerate the implementation of the Climate Action Plan measures to limit and counteract emissions growth associated with increased social and economic activity from future population growth.

17.2.2.5 Local

The Galway City Council Climate Action Plan 2024-2029 aims to create a low carbon and climate resilient City, by delivering and promoting best practice in climate action, at the local level. The vision for the Plan is to be a climate resilient, biodiversity rich, environmentally sustainable and carbon neutral city by no later than the end of 2050, including a commitment by Galway City Council to reduce its emissions by 51% versus a 2018 baseline by 2030. This will be achieved by delivering transformative change and measurable climate action within GCC's organisation and services and across Galway City, through leadership, example, and mobilising action at a local level. The Plan lists as an action to "*support the development of greater accessibility, modal shift and active travel throughout Galway City through implementation of work programmes and Galway Transport Strategy (GTS)"* which includes the Project.

The Galway County Council Climate Action Plan 2024-2029 aims to deliver and support best practice in climate action, at the local level. The Plan sets out a clear vision and mission and aligns with Ireland's National Climate Objective, aiming for a climate-resilient, biodiversity-rich, environmentally sustainable, and climate-neutral economy by 2050. The Mission Statement outlines how Galway County Council will meet that vision. Internally, the ambition is to meet its own emissions and energy efficiency targets. They are seeking a 51% reduction versus a 2018 baseline in GHG emissions and a 50% improvement in energy efficiency by 2030. The vision statement of the Plan states:

'The communities, environment and economy of the County of Galway are thriving, climate-resilient, biodiversity-rich, environmentally sustainable and carbon neutral.'

Key goals, objectives and actions under the Plan fall under the themes of:

- Governance and Leadership
- Energy Built Environment
- Transport
- Communities and Enterprise
- Circular Economy
- Land Use and Green Infrastructure
- Adaptation to Climate Risk

17.2.3 Data Sources

The EPA's Ireland's Greenhouse Gas Emissions Projections 2023-2050 was referred to for the purposes of determining the baseline environment, which includes total projected emissions and a breakdown of projected emissions per sector under the "With Existing Measures" and "With Additional Measures" scenarios. Other EPA publications are relied upon to provide baseline information for the predicted future weather conditions, e.g. the EPA (2021) The Status of Ireland's Climate 2020.

17.2.4 Study Area

The potential impacts on climate are based on the national implications of changes in carbon emissions due to the Project, considering Ireland's climate commitments and carbon budget. Therefore, the study area encompasses the Republic of Ireland.

The assessment of operational phase CO_{2eq} emissions is based on the outputs from the transport model which are experienced over the area of influence following the introduction of the Project. The extent of this model and area of influence is described in Section 6.2.3 of this updated EIAR.

17.2.5 Assessment Methodology

17.2.5.1 Construction Phase

The assessment of carbon emissions was carried out to determine the likely GHG emissions (CO_{2eq}) predicted due to the construction phases of the Project.

Construction materials are manufactured using carbon intensive practices, which results in embodied carbon associated with the materials. The results of this assessment have been compared with carbon budgets. The assessment considers the material manufacture, the transport of construction materials to site, the construction processes and the construction compounds.

The TII Carbon Assessment Tool (Version 3) (TII 2022) (hereafter referred to as the TII Carbon Tool) has been used to calculate the embodied carbon of materials, which incorporates the energy used in the mining or processing of the raw material and its manufacture, in terms of CO_{2eq}. The TII Carbon Tool uses emission factors from recognised sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (CESSM, 2013).

For a small number of materials not covered by the TII Carbon Tool, the UK Environment Agency's (UKEA) Carbon Calculator has been used to estimate carbon emissions due to construction activities in terms of CO_{2eq}. In addition, the UKEA Carbon Calculator has been used to estimate embodied carbon associated with the transportation of materials to and from site. The carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be used over the construction phase. The varying, relevant transport distances have been included in the calculations for the transportation of materials to and from site.

The assessment includes the pre-construction (site clearance) stage, the assessment of the embodied carbon associated with all materials used in the construction phase, the emissions during the construction phase and, additionally, emissions related to waste generated during the construction phase.

The assumptions made in the assessment of embodied carbon likely to be generated during the construction phase are described in Appendix A.17.1.

17.2.5.2 Operational Phase

The change in GHG emissions due to operational phase traffic effects of the Project have been assessed using the NTA Environmental Appraisal Module, which is based on the ENEVAL software. ENEVAL was developed by Systra Ltd. in 2015 on behalf of the NTA. ENEVAL incorporates the official EU vehicle standard emission factor database, termed COPERT, and the emission data from the UK National Atmospheric Emissions Inventory (NAEI). Emissions from the zonal level ENEVAL tool can provide information on the CO_{2eq} emissions for the different traffic scenarios on a regional basis. The ENEVAL software is recommended by the Codema in the publication Developing CO_2 Baselines – A Step-by-Step Guide for Your Local Authority (Codema 2017b).

It is estimated that the Year of Opening of the proposed N6 GCRR is 2031. As per TII Traffic and Transport Guidelines, the proposed N6 GCRR must also be assessed for a future year of 15 years after the first year of operation. Therefore, 2046 is chosen on this basis as the Design Year.

In order to assess the potential operational traffic impacts of the Project, two future year models were developed to represent the proposed N6 GCRR Opening Year (2031) and Design Year (2046).

17.2.5.3 Construction and Operational Phase Significance Criteria

The TII Climate Standard outlines a recommended approach for determining the significance of all phases of a proposed project. The approach, which can be seen in Table 17.4 below, is based on the net project GHG emissions relative to the sectoral carbon budgets. As the Project will not fall within the remit of the ETS, predicted GHG emissions are compared against the non-ETS budgets and baseline.

Table 17.4 Climate Significance Criteria (Source: TII)

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 provide reductions required by local or national policies • 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 • 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 • 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 • 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 • Well, 'ahead of the curve' for Ireland's trajectory towards net zero, provides a positive climate impact

17.2.5.4 Vulnerability of the Project to Climate Change

The operational phase assessment also involves determining the vulnerability of the Project to climate change. This involves an analysis of the sensitivity and exposure of the development to climate hazards which together provide a measure of vulnerability.

The TII Climate Standard outlines an approach for undertaking a risk assessment where there is a potentially significant impact on the Project receptors due to climate change. The risk assessment assesses the likelihood and consequence of the impact occurring to each receptor, leading to the evaluation of the significance of the impact.

Likelihood refers to how likely the identified climate hazards are to occur the lifetime of the project. Consequence refers to the severity or magnitude of the impact associated with the climate risk, should it eventuate.

The likelihood and consequence of each impact is combined in the form of a matrix to identify the significance of each impact as outlined in Table 17.5.

Table 17.5 Vulnerability Significance Matrix (Source: TII)

Likelihood	Magnitude of Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	Not significant	Not significant	Not significant	Significant	Significant
Unlikely	Not significant	Not significant	Not significant	Significant	Significant
Moderate	Not significant	Not significant	Significant	Significant	Significant
Likely	Not significant	Significant	Significant	Significant	Significant

Likelihood	Magnitude of Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Significant	Significant	Significant	Significant	Significant

Legend

Low	Medium	High	Extreme

17.2.6 Comparison of methodology to 2018 EIAR

The 2018 EIAR and documentation submitted to An Bord Pleanala as part of the application for approval were published prior to the publication of the TII Climate Standard and associated tools. Those assessments relied upon IEMA guidance, UK Environment Agency construction carbon calculator and the UK DMRB spreadsheet for the purposes of assessing carbon, calculating construction carbon and operational phase carbon respectively.

The IEMA guidance was superseded in 2022 by the updated guidance issued by the IEMA entitled "Assessing Greenhouse Gas Emissions and Evaluating their Significance". The revised significance criteria in that updated guidance broadly align with the TII Climate Standard. The TII Climate Standard includes significance criteria which are directly applicable to the Irish context and which are, therefore, appropriate to apply in the context of the proposed Project.

Similarly, the TII construction carbon calculator includes for Irish specific emission factors (where available) and is therefore more robust than the UK Environment Agency calculator used in the assessment presented in the 2018 EIAR.

The NTA ENEVAL model was used to compute operational phase carbon emissions. This model includes changes in traffic on a regional basis and is considered more robust than the DMRB spreadsheet used in the 2018 assessment which only considers changes in traffic at a local level. The ENEVAL model also uses up-to-date emission factors which have been developed in the Irish context, generating a more accurate output when compared to the DMRB spreadsheet.

17.3 Receiving Environment

17.3.1 Baseline Greenhouse Gas Emissions

The Environmental Protection Agency (EPA) is the Competent Authority with responsibility for developing, preparing and publishing projections of greenhouse gas emissions for Ireland. The EPA produces national greenhouse gas emission projections on an annual basis. These projections are compiled in line with European Union (EU) guidelines to meet EU reporting obligations. At a national level, this assessment informs policy and the monitoring and reporting of Ireland's climate action performance to Government under the Climate Act and to the public as outlined in CAP24.

The Climate Act has specified the base year of 2018 against which a 51% emission reduction is to be achieved by 2030. The carbon budget sets a target of 50% reduction on carbon emissions relative to 2018 emissions for the transport sector.

In May 2024, the EPA released the report Ireland's Greenhouse Gas Emissions Projections 2023-2050, which includes total projected emissions and a breakdown of projected emissions per sector under the "Sectoral Emissions Ceilings and associated percentage change in emissions" and "Sectoral Assessment of Projections out to 2030" sections. The sectoral emissions ceilings for the transport sector are set at 54 Mt CO_{2eq} for 2021-2025 and 37 Mt CO_{2eq} for 2026-2030, which, if achieved, will approximate to a 50% reduction in the sector's greenhouse gas emissions in 2030 compared with 2018.

For transport, implementation of "Additional Measures" (including those in CAP24) is projected to deliver a 29% emission reduction by 2030 compared to the 2018 level, while the implementation of "With Existing

Measures" can deliver an 11% emission reduction over the same period. This represents a reduction of 3% per annum in emissions over the period 2018 to 2030 with the implementation of the "Additional Measures".

Table 17.6 presents the EPA With Existing Measures and Additional Measures scenarios for 2028 (assumed worst case construction year), 2031 (year of opening of proposed N6 GCRR which is at the completion of Phase 2 of the Project) and 2046 (design year). 2028 is assumed as the worst-case construction year as the majority of construction emissions occur within the first year of construction of the proposed N6 GCRR element of the Project.

Table 17.6 Projected Emissions for the Transport and non ETS Sector Total Emissions (Source: EPA, 2024)

Projections	Year	Transport ($Mt\ CO_{2eq}$)	National Total (excluding LULUCF (Land use, Land use Change and Forestry)) ($Mt\ CO_{2eq}$)
Projections (with existing measures)	2028	11.3	53.8
	2031	10.9	51.5
	2046	5.7	42.7
Projections (with additional measures)	2028	9.9	48.3
	2031	8.4	42.5
	2046	4.9	33.7

According to EPA projections, transport emissions are projected to decrease by 5 to 26 per cent over the period 2022-2030. Measures that are projected to contribute to higher emissions reductions include 943,500 EVs by 2030, a 20 per cent biodiesel blend rate by 2030 and avoid/shift measures such as a 50 per cent increase in daily active travel journeys and a 130 per cent increase in daily public transport journeys.

CAP24 sets out the transport measures required to meet the transport carbon budget through the Avoid-Shift-Improve framework. CAP24 projections vary from EPA projections. For example, the CAP24 measure of a 65% increase in the pump price of petrol and diesel from 2018 to 2030 as part of the 20% reduction in total vehicle kilometres is not included in the latest EPA projections.

According to the EU Commission (CO_2 emission performance standards for cars and vans - European Commission (europa.eu)), with stricter CO_{2eq} emission targets in place since 2020, the average CO_{2eq} emissions from all new passenger cars registered in Europe fell by 27% between 2019 and 2022, while the average emissions from new vans dropped by 10%. The main driver of this decrease in emissions is the surge in zero-emission vehicles, which respectively amounted to 13.4% and 6% of the 2022 EU (and Norway and Iceland) new car and van fleet. According to the same report, lorries, buses and coaches are responsible for more than a quarter of GHG emissions from road transport in the EU, and for over 6% of total EU GHG emissions. Despite some improvements in fuel consumption efficiency in recent years, these emissions are still rising, mainly due to increasing road freight traffic.

17.3.2 Climate Baseline for the Purposes of the Assessment of Climate Change Vulnerability

The EPA (2019) Irish Climate Futures: Data for Decision Making report states that it is expected that weather extremes will become more likely and more frequent with future climate change.

The EPA (2021) The Status of Ireland's Climate 2020 includes a number of recent climate observations for Ireland. The report states that the annual average surface air temperature in Ireland has increased by approximately 0.9°C over the last 120 years, with a rise in temperatures being observed in all seasons. This compares with a global average temperature estimated to be 1.1°C above pre-industrial levels. The report indicates that the sea level around Ireland has risen by approximately 2–3 mm per year since the early 1990s. In addition, annual precipitation was 6% higher in the period 1989 to 2018, compared to the 30-year period 1961 to 1990.

Analysis of the meteorological records shows that Ireland's climate is changing in line with global patterns.

According to the EPA[1] climate change is expected to lead to the following adverse effects:

- Sea level rise
- More intense storms and rainfall events
- Increased likelihood and magnitude of river and coastal flooding
- Water shortages in summer in the east
- Adverse impacts on water quality
- Changes in distribution of plant and animal species
- Effects on fisheries sensitive to changes in temperature

LA 114 Climate (UKHA 2021) outlines that the study area for assessing a project's vulnerability to climate change should be based on the construction footprint/project boundary (including compounds and temporary landtake).

The region where the Project will be located has a temperate, oceanic climate, resulting in mild winters and cool summers. The recent weather patterns and extreme weather events recorded by Met Éireann have been reviewed. A noticeable feature of the recent weather has been an increase in the frequency and severity of storms with notable events including Storm Darwin in February 2014, Storm Emma in March 2018, Storm Ophelia in October 2018, Arwen and Barra in 2021 and most recent Storm Éowyn in January 2025. Heavier historical rainfall events have also been recorded in recent years including heavy rainfall and flooding.

TRANSLATE (Met Éireann, 2023b) provides the first standardised and bias-corrected national climate projections for Ireland to aid climate risk decision making across multiple sectors (for example, transport, energy, water), by providing information on how Ireland's climate could change as global temperatures increase to 1.5˚C, 2˚C, 2.5˚C, 3˚C or 4˚C.

17.4 Characteristics of the Project

The characteristics of the five phases of the Project detailed in Chapter 5 of this updated EIAR that will potentially impact on Climate during the construction and operation phase are set out in Sections 17.4.2 and 17.4.3 respectively.

17.4.1 Project phases

Further details on the five phases of the Project detailed in Chapter 5 of this updated EIAR.

17.4.1.1 Phase 1

Phase 1 includes the construction of a temporary stableyard including horsebox parking, machinery shed, maintenance shed, ESB substation, two wells, new pre-parade ring and pavilion on Galway Racecourse lands. (Approval for which was granted by Galway City Council in December 2024 Planning Ref. No.:24/60279).

17.4.1.2 Phase 2

Phase 2 comprises the construction and operation of the proposed N6 GCRR. Phase 2 comprises the most significant characteristic of the Project likely to impact on climate.

17.4.1.3 Phase 3

Phase 3 comprises the construction of the new permanent stable yard including horsebox parking post handover of the proposed N6 GCRR. (Approval for which was granted by Galway City Council in December 2024 Planning Ref. No.:24/60279).

[1] What impact will climate change have on Ireland? | Environmental Protection Agency (epa.ie)

17.4.1.4 Phase 4

Phase 4 comprises the demolition of the temporary stables constructed in Phase 1. (Approval for which was granted by Galway City Council in December 2024 Planning Ref. No.:24/60279).

17.4.1.5 Phase 5

Phase 5 is the operational phase of the Project.

17.4.2 Construction Phase

The construction of the Project will require the use of construction materials and the transportation of these materials to site, refer to Chapter 7, Construction Activities for further details. A full list of inputs used in the assessment of construction phase carbon is provided in Appendix A.17.1.

17.4.3 Operational Phase

The most significant operational impacts will arise due to traffic movement associated with the Project. Operational phase effects have the potential to arise due to the redistribution of traffic from existing roads to the Project.

Predicted traffic volumes are outlined in Chapter 6, Traffic Assessment and Route Cross-section.

17.5 Assessment of Potential Effects

17.5.1 Do-Minimum Effects

As described in Section 4.5 of Chapter 4, the climate assessment relies on the outcome of the transport modelling which is based on Do-Minimum and Do-Something traffic scenarios. The Do-Minimum scenario is assessed against the Do-Something scenario in the following sections.

17.5.2 Do-Something Effects

17.5.2.1 Potential Construction Effects

To quantify the construction and maintenance phase embedded carbon, the assessment team utilised the TII Carbon Tool (TII 2022). This tool has the ability to quantify carbon in infrastructure projects using Ireland-specific emission factors and data and considers embodied carbon due to construction materials and associated transportation.

Detailed project information including site clearance areas, excavation quantities (along with the type and volume of waste generated, coupled with the nature of the waste treatment, e.g., reuse, recycling, recovery or disposal), and construction material quantities (e.g., tonnage of materials) was obtained from the Engineering Design Team for all phases of the Project (refer to Appendix A.17.1 for further details). The duration of the construction phase is expected to be approximately 60 months with the majority of works occurring over a 36-month period (Phase 2) and an operational lifespan of 60 years for the purposes of the maintenance embodied carbon which assumes replacement every 20 years. The predicted GHG emissions can be averaged over the full construction phase to give the predicted annual emissions to allow for direct comparison with annual emissions and targets.

The assessment commences with the high-level design, through the pre-construction (site preparation) stage, followed by the assessment of the embodied carbon associated with all materials used in the construction of the Project, the emissions during the construction phase and additionally emissions related to waste generated during the construction phase. The tool also assesses on-going maintenance associated with an assumed 60-year lifespan of the Project. For infrastructure projects it is generally assumed that end-of-life demolition is not relevant and thus there are no emissions associated with this stage.

Construction emissions have been compared against Ireland's transport carbon budget. Maintenance phase emissions are calculated using the TII Carbon Tool and accounted for as operational phase emissions.

The assessment has been broken down into a number of segments:

1. Pre-construction/site clearance emissions associated with plant and machinery required to clear the site. The carbon tool has a range of assigned land use categories for estimating site clearance. Different land use types have higher or lower carbon intensity for site clearance, which is linked to the energy required to clear the site.
2. Embodied carbon is the carbon contained within a material or product. It is the sum of all carbon emissions that have been generated during the extraction, processing, and manufacturing of a particular product. Maintenance material impact is calculated automatically based upon defined replacement rates of materials during the project's lifetime. The impact of transporting materials from factory/source to site to facilitate construction is reported separately. A series of assumptions are made about the variables that impact transport emissions (material density, vehicle type, vehicle capacity and distance travelled). Refer to Appendix A.17.1 for further information.
3. Emissions arising from excavation activities based on the energy used in excavation activities. Energy expenditure varies depending on the type of ground to be excavated, e.g., rock excavation is much more energy intensive than topsoil excavation.
4. Construction activities cover carbon emissions generated during the construction of the Project based on the scale and duration of the project.
5. The generation of waste during the construction phase has potential for climate impact and the nature and scale of this impact depends on the type and volume of waste generated coupled with the nature of the waste treatment (reuse, recycling, recovery or disposal).

Based on the TII Carbon Tool, the breakdown of the activities between the different phases of the Project has been assessed. As shown in Table 17.7, the assessment indicates that the key phases of GHG generation relate to construction materials and activities, which account for 98% of all construction phase carbon emissions.

Table 17.7 Construction and Maintenance Stage Greenhouse Gas Emissions

Activity	Project Element	Construction and Maintenance Emissions (tonnes CO_{2eq})	Percentage of Total (%)
Embodied carbon	Earthworks excavation	32,727	25.9
	Demolition + clearance	86.5	0.07
	Pavement	23,066	18.3
	Structures	59,289	46.9
	Vegetation removal	99.9	0.08
	Water and energy	2	0
	Waste	8,320	6.6
	Total	*123,509*	
Transport and maintenance	Material	738	0.6
	Construction / demolition vehicles	1,392	1.1
	Before use construction - workers	1,028	0.8
	Waste	395	0.3
	Use stage - maintenance	0.2	0.0
	Total	*3,553*	

Activity	Project Element	Construction and Maintenance Emissions (tonnes CO_{2eq})	Percentage of Total (%)
Planting	Landscaping and vegetation	-812	
Total over construction period		126,332	100
Total per annum (assuming a 3-year construction programme for the bulk of these arisings)		42,111	

The total annualised CO_{2eq} predicted to be generated by the Project through all phases of construction, is expected to be 0.7% of Ireland's transport budget for 2030 ($6MtCO_{2eq}$). This figure allows for the reduction in emissions as a result of landscaping and vegetation. This is expected to result in short-term major adverse effects on climate in the absence of mitigation based on significance criteria outlined in 17.2.5.3. This impact rating pre-mitigation is assigned as short-term major adverse because the Project's construction phase GHG impacts are not mitigated and do not provide the reductions required by policy.

The generation of GHG to accommodate the construction of the proposed Project results in an increase in emissions, which is inevitable for any transport infrastructure development. However, as outlined in Section 17.2.2.4, transport emissions are required to reduce by 50% by 2030 relative to 2018 emissions to set a path to reach net-zero emissions by no later than 2050, as committed to in the Climate Act. The increase in emissions during the construction phase does not result in a meaningful absolute contribution to Ireland's trajectory towards net zero which is the basis for the impact rating, as described in Table 17.4.

Refer to Section 17.6.2 for details of mitigation measures during the construction phase which will be implemented to reduce GHG emissions to align with policy.

17.5.2.2 Potential Operational Effects

17.5.2.2.1 Greenhouse Gas Emissions

The predicted change in operational phase CO_{2eq} emissions between the Do-Minimum (DM) scenario compared to the Do-Something (DS) scenario is provided in Table 17.8 for the Opening Year (2031) and design year (2046) of the proposed N6 GCRR based on the methodology outlined in Section 17.2.5. The assessment of future year emissions considers traffic movements with the Project (DS) and without the Project (DM) in place in accordance with the requirements for EIA. Refer to Chapter 6, Traffic and Cross-section for a detailed description of what comprises the DM and DS scenarios.

Table 17.8 Predicted Change in CO_{2eq} Emissions in 2031 and 2046 relative to Ireland's Climate Commitments

Year	Predicted DM Annual Emissions (tonnes/yr)	Predicted DS Annual Emissions (tonnes/yr)	Change DM to DS (tonnes/yr)	% Change DM to DS	% Change in CO_{2eq} relative to the 2030 Transport Budget
2031	493,796	498,381	4,584	0.93	0.0764
2046	125,392	126,054	662	0.53	N/A

When comparing the DM and DS scenarios, the Project is predicted to result in a 0.93% increase in CO_{2eq} emissions due the predicted traffic changes on the road network in 2031. The predicted change in emissions corresponds to an increase of 0.0764% relative to Ireland's transport carbon budget in 2030. In accordance with the criteria outlined in Table 17.4 the significance level is deemed to result in permanent moderate adverse effects in EIA terms in the absence of mitigation. It is noted that increases in CO_{2eq} emissions are significantly lower in 2046 when compared to 2031. This is due to future projections of reduced CO_{2eq} emissions resulting from EU regulation and increased electric vehicle use.

By way of comparison, the construction of a detached house is estimated to generate approximately 33 tonnes of CO_{2eq} so the construction of 139 detached houses would result in a figure of approximately 4,584 tonnes of CO_{2eq}.

17.5.2.2.2 Climate change vulnerability

Climate adaptation seeks to ensure adequate resilience of major projects to the adverse impacts of climate change, such as increased flooding or droughts.

A risk assessment has been conducted for potentially significant impacts on the Project associated with climate change. The risk assessment considered the likelihood and consequence of potential impacts occurring and then provided an evaluation of the significance of the impact using the framework set out in Table 17.5.

The flood risk assessment included in Chapter 11, Hydrology states that the sources of flood risk identified in the study area can be managed to acceptable levels in accordance with relevant guidance.

EPA research (EPA 2020) shows an overall reduction of approximately 10% in the numbers of storms affecting Ireland and suggest an eastward extension of the more severe windstorms over Ireland and the UK from the middle of the century. However, the research notes that this should be taken with some caution as extreme storms are rare events.

In addition, the research indicated a likely reduction in windspeed by the mid-century. A summer reduction in 10-m wind speed range is expected from 0.3% to 3.4% for the RCP (Representative Concentration Pathway) 4.5 (medium global emission) scenario and from 2% to 5.4% for the RCP8.5 (high global emission) scenario.

Based on EPA projections and the nature of the Project, the greatest climate-related risks relate to extreme rainfall and extreme heat. Extreme rainfall can result in the overflow of drainage systems causing flooding. Extreme heat can affect pavement durability, causing cracking or damage resulting in reduced reliability and design life.

As outlined in Chapter 11, Hydrology, there is a potential to increase peak flow rates and runoff volumes due to the increased impermeable area associated with the Project and the collecting drainage system which discharges at outfall points. The implementation of SuDS through the incorporation of engineered wetlands, attenuation ponds, infiltration basins and controlled discharges at all outfalls will control storm runoff rates to greenfield flood runoff rates and will not exacerbate flooding and flood risk in the receiving watercourses. As part of the proposed drainage design, attenuation storage has been sized to accommodate the 100-year storm event with 20% climate change allowance. Should the rare flood event occur, the magnitude of consequence is expected to be moderate, resulting in a not significant effect in EIA terms based on the criteria set out in Table 17.5.

The likelihood of the extreme heat is unlikely. Should the unlikely event occur, the magnitude of consequence is expected to be minor, resulting in a not significant effect in EIA terms based on the criteria set out in Table 17.5.

Therefore, the conclusion of the impact assessment of the vulnerability of the Project to climate change due to flood risk, extreme heat and extreme rainfall is that no significant adverse impacts are likely due to the vulnerability of the Project to climate change.

17.6 Mitigation Measures and Monitoring

17.6.1 Introduction

This section outlines the proposed mitigation measures relating to potential climate effects.

17.6.2 Construction phase

A series of mitigation measures have been incorporated into the construction design with the goal of reducing the embodied carbon associated with the construction phase of the Project. These measures include:

- The substitution of concrete containing Portland cement with concrete containing ground granulated blast furnace slag (GGBS). This measure has led to an estimated saving of c.1,034 tonnes of CO_{2eq} in the current design (50% of cement as GGBS) of the Project
- The use of steel which comprises of a minimum of 70% recycled steel

- The Project will minimise wastage of materials due to poor timing or over ordering on site thus helping to minimise the embodied carbon footprint of the Project - refer to Chapter 20, Waste and Resource Management
- Where practicable, opportunities for materials reuse will be incorporated within the extent of the Project including the use of reclaimed asphalt and recycled aggregate
- Where practicable, materials will be sourced locally to reduce the embodied emissions associated with transport

The Contractor will be required to implement an Energy Management System for the duration of the works. This will include the following at a minimum:

- Use of thermostatic controls on all heating systems in site buildings
- The use of insulated temporary building structures
- The use of low energy equipment and power saving functions on all computer systems
- The use of low flow tap fittings and showers
- The use of solar/thermal power to heat water for the on-site welfare facilities including sinks and showers

In addition, in June 2024, the Government provided procurement guidance to public bodies to promote the reduction of embodied carbon in publicly supported construction projects and construction materials[2]. These measures include the following which must be adhered to during the procurement process of the Project:

- Concrete products including poured or pre-cast products, should in general specify a minimum of 30% clinker replacement, consistent with IS EN 206, except where a technical justification is made by a suitably qualified professional to the satisfaction of the procurer.
- High-carbon CEM I cement products should not be procured by public bodies, or used in publicly produced construction projects, except where a technical justification is made by a suitably qualified professional to the satisfaction of the procurer.
- Public bodies should seek an Environmental Product Declaration, to an EN 15804 standard, or equivalent when directly procuring cement or concrete products. Confirmation of a similar disclosure should be sought by public bodies, where a contracted party is managing materials procurement. When available, public bodies should require a Declaration of Performance and Compliance under the Construction Product Regulation.
- Public bodies procuring infrastructure projects (construction other than buildings) in receipt of exchequer funding in excess of €60 million, should produce or procure a Whole Life-Cycle Greenhouse Gas Emissions assessment for their project. Public bodies should identify the most appropriate, available methodology to ensure that the project's embodied carbon is suitably interrogated, and applicable to the infrastructure or project-type.

A Construction Traffic Management Plan (CTMP) is included in Appendix A.7.5. The measures outlined in this plan will have the effect of further reducing carbon emissions.

No monitoring is required during the construction phase.

17.6.3 Operational Phase

As no significant adverse impacts are likely due to the vulnerability of the Project to climate change, no mitigation measures are required.

[2] Procurement guidance for public bodies: Reducing embodied carbon in construction - DETE (enterprise.gov.ie)

Carbon emissions are reduced through the implementation of a speed limit of 100km/hr which is less than the 120km/hr that usually applies to motorway schemes. Emissions are lowest between 55 and 95km/hr, increasing at higher and lower speeds. This measure is assumed to be in place in the assessment outlined in Section 17.5.2 so is deemed to be mitigation through design.

Measures included in the Climate Action Plan and EU legislation have the potential to reduce emissions into the future. Although not considered to be mitigation measures for the purposes of the proposed Project, these measures are included here to demonstrate that emissions will continue to decrease due to regulation.

EU Regulation 2023/1623 sets the following emission standards:

- Cars: 93.6g CO_{2eq}/km (2025-2029) and 49.5g CO_{2eq}/km (2030-2034)
- Vans: 153.9g CO_{2eq}/km (2025-2029) and 90.6g CO_{2eq}/km (2030-2034)

From 2035 onwards**,** the EU fleet-wide CO_2 emission target for both cars and vans is 0 g CO_{2eq}/km, corresponding to a 100% reduction. This is evidenced in Table 17.8 above whereby the trajectory is clearly decreasing from 2031 to 2046.

In May 2024, the EU formally adopted the regulation on CO_2 emission standards for heavy-duty vehicles, amending and strengthening the existing EU rules. The updated rules will further reduce CO_{2eq} emissions from road transport and will introduce new targets for 2030, 2035 and 2040.

The regulation establishes the following new targets for heavy lorries weighing over 16t:

- a 45% emissions reduction from 2030
- a 65% emissions reduction from 2035
- a 90% emissions reduction from 2040

These targets will apply to medium lorries, heavy trucks weighing over 7.5t and coaches, as well as to corresponding vocational vehicles from 2035 onwards.

The new rules introduce a 100% zero-emission target for new urban buses by 2035, with an intermediate target of 90% for this category by 2030. Under CAP24, the following is proposed for the private car fleet by 2030:

- Battery electric vehicle (EV) share of total passenger car fleet (30%)
- EV share of new registrations (100%)
- 845,000 private EVs

The following is proposed for the commercial fleet in 2030:

- 20% EV share of total LGV fleet: 95,000 commercial EVs
- 30% zero-emission share of new heavy duty vehicle registrations: 3,500 HGVs

It is noted that these measures should be implemented prior to the opening year of the Project in 2031.

No monitoring is required during the operational phase.

17.7 Residual Effects

In accordance with the TII Climate Standard, the impact of the Project should be considered based on its whole lifecycle. Based on the criteria outlined in Table 17.4, the Project is expected to have a permanent moderate adverse effect on climate during over its lifecycle. This is on the basis of the following:

- The Project's GHG impacts are partially mitigated. Measures are proposed during the construction phase which will have the effect of reducing the generation of embodied carbon as described in Section 17.6. This has the effect of reducing the level of impact of construction phase effects from major to moderate.

No specific operational phase mitigation measures are proposed; the Project relies upon measures that are specified in CAP24 and EU Regulation to reduce carbon emissions in the future

- Although the Project is expected to result in an increase in GHG emissions during its operational phase and therefore falls short of full contribution to Ireland's trajectory to net zero, these increases will decrease over time through the implementation of measures outlined in CAP24 and EU regulation as demonstrated by the outcomes of the assessment of the 2046 scenario.

In relation to the European Commission's 2021 'Technical guidance on the climate proofing of infrastructure in the period 2021-2027', see Section 17.9 below.

17.8 Cumulative Effects

In accordance with the TII Climate Standard, the impact of the Project should be considered based on its whole lifecycle. As outlined in Section 17.2.4, the study area for the climate assessment encompasses the Republic of Ireland as the Project is assessed relative to climate commitments and carbon budgets.

The European Commission produced its Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report in 2017. The guidance states that *'cumulative effects can occur at different temporal and spatial scales. The spatial scale can be local, regional or global…*'

As outlined in the Transport Infrastructure Ireland (TII) Climate Guidance for National Roads, Light Rail, and Rural Cycleways (Offline & Greenways) - Overarching Technical Document: *"Cumulative impact assessment in EIAR requires that the impact from a project is assessed cumulatively with other projects being brought forward in a defined geographical and temporal boundary. However, as the identified receptor for 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 assessment of residual effects as described in Section 17.7, considers that the proposed Project is expected to have a permanent moderate adverse effect on climate during over its lifecycle. This level of impact assessment is based on the TII Climate Standard significant criteria which is determined in the context of the Project's alignment to Ireland's trajectory of net zero. As outlined in the preceding paragraph, the assessment of the Project relative to Ireland's national carbon reduction target is inherently cumulative.

The EPA is the Competent Authority with responsibility for developing, preparing and publishing projections of greenhouse gas emissions for Ireland. The EPA produces national greenhouse gas emission projections on an annual basis. These projections are compiled in line with European Union (EU) guidelines to meet EU reporting obligations. In May 2024, the EPA produced its projections for the period 2023 to 2050 EPA-GHG-Projections-Report-2022-2050-May24--v2.pdf. These projections include for emissions associated with the transport sector. Therefore, it is reasonable to assume that carbon emissions are cumulatively accounted for under the EPA projections.

The CAP24 outlines measures to achieve Ireland's climate commitments and carbon budgets on a national level through mitigation. CAP24 sets out measures to reduce carbon emissions in electricity, industry, buildings, transport and agriculture to ensure these commitments are reached. These measures are applied at a national level to cumulatively reduce carbon emissions on a national basis. The implementation of these measures will have the effect of cumulatively reducing the climatic effects of the Project and other plans/projects resulting in an overall positive effect. As outlined in CAP24, the implementation of the Plan together with the Long-term Climate Strategy, *will set the strategic direction for meeting our climate targets.*

17.9 EU Technical Guidance Assessment

In July 2021, the EU Commission published 'Technical guidance on the climate proofing of infrastructure in the period 2021-2027'. The purpose of the publication is to give technical guidance on the climate proofing of investments in infrastructure covering the programming period 2021-2027. The guidance acknowledges

that '*most projects will have an impact on GHG emissions, compared to the Baseline, through their construction, operation, and eventual decommissioning and through indirect activities that occur because of the project. This should be seen in the context of the project not as an isolated event but as a set of different and complementary interventions – in particular stemming from a plan. This might mean that a certain specific project does not have an individual net GHG reduction effect but is integral part of an overall plan that reduces emissions.*

In response to the technical guidance an assessment of the measures provided in the GTS and CAP24 are also considered alongside the Project and compared to a Do-Nothing scenario – without the GTS and CAP24 for 2030. Refer to Chapter 6, Traffic Assessment and Route Cross-section for details of the modelling assumptions developed for this scenario.

As demonstrated from the results provided in Table 17.9 when comparing the scenarios with and without the Project, GTS and CAP24, an 8% decrease in CO_{2eq} emissions due to the predicted traffic changes on the road network in 2030 is expected to arise. The predicted change in emissions corresponds to a decrease of 0.59% relative to Ireland's transport carbon budget in 2030.

Table 17.9 Predicted change CO_{2eq} emissions in 2030 relative to Ireland's climate commitments

Year	Predicted (Do-Nothing) annual emissions (tonnes/yr)	Predicted annual emissions including the Project, GTS and CAP24 (tonnes/yr)	Change DM to DS (tonnes/yr)	% change DM to DS	% Change in CO_{2eq} relative to the 2030 transport budget
2030	461,917	426,436	-35,480	-8	-0.59

17.10 Climate Action Plan Assessment

17.10.1.1 Introduction

Sections 17.5 to 17.7 of this chapter presents the assessment of effects on climate during the construction and operation phase of the Project by comparing the emissions in a scenario with the proposed Project to a scenario without the proposed Project in the Opening Year and Deign Year. As the EIA assessment only considers the effects of the Project, it cannot account for emission reductions associated with additional commitments which will arise from the delivery of the Galway Transport Strategy (GTS) or the most recent approved climate action plan, CAP24.

As outlined in Section 17.1, a separate assessment has been carried out in response to the ABP request for *'submissions in relation to the most recent Climate Action Plan'*. The reductions in carbon emissions likely to arise from the GTS and CAP24 in conjunction with the Project are presented in that report. The assessment considers the following in response to CAP24 transport targets:

- Emissions reductions
- Vehicle kilometre reductions

The findings of the assessments are summarised in the following sections.

17.10.1.2 Emissions reductions

The CAP24 targets a 50% reduction in carbon emissions by 2030 compared to 2018 levels. A traffic modelling scenario was developed for the purposes of assessing the potential reductions in carbon emissions relative to 2018 levels with the inclusion of a level of demand management measures (CAP DS). These measures are expected to change behaviours or travel mode choices and help achieve the CAP targets - refer to Chapter 6 for further details.

When comparing the CAP DS scenario to the base 2018 scenario, an approximate 43% reduction in vehicle emissions in the study area is predicted to occur. While this figure falls short of meeting the 50% target set out in CAP24, it does show that a significant emissions reduction can be achieved with the Project in place, whilst also catering for an approximate 30% increase in the population level across the metropolitan area by 2030, versus 2016 levels.

17.10.1.3 Vehicle kilometre reductions

The CAP24 targets a 20% reduction in total vehicle kilometres by 2030 compared to a 2030 Business-as-Usual (BAU) scenario. A traffic modelling scenario was developed for the purposes of assessing the potential reductions in vehicle kilometres between the CAP DS scenario compared to a BAU scenario. The BAU scenario effectively means a continuation of current trends/policy (in the absence of CAP) - refer to Chapter 6 for further details.

When comparing the CAP DS to the BAU scenario, the reduction in car kilometres is predicted to be 18%, while the total vehicle kilometre reduction predicted is 16%. Again, whilst these figures fall just short of the 20% national target set out in CAP24, they do show a significant reduction.

17.11 Assessment relative to the plans, strategies and objectives specified in Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended)

17.11.1.1 Introduction

Section 15 of the Climate Act stipulates that a relevant body (An Bord Pleanala in this case) must, *"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."

An assessment of the Project, the Galway Transport Strategy (GTS) and CAP24 relative to each of the matters specified in Section 15 is provided below.

17.11.1.2 The most recent approved climate action plan

An assessment of the most recent approved climate action plan, CAP24, is provided in the *'Obligations under Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended) and submissions in relation to the Climate Action Plan 2024'* Report prepared in response to the RFI from ABP. It forms Part IV of the 2025 RFI Response. The report concludes that "*the delivery of the N6 GCRR as an integral part of the GTS, and of all relevant measures set out in CAP24, as well as other national level measures, contributes significantly towards the achievement of these national level targets. Therefore, the N6 GCRR, when delivered in tandem with demand management measures set out in CAP24 and as an integral part of the GTS is consistent with the Climate Action Plan 2024*." Refer to Section 17.9 above for further details on consistency of the Project with CAP24.

In addition, Chapter 10 (Public Sector Leading by Example) of CAP24 sets out certain requirements in relation to public sector procurement practices, including for example that public sector bodies, including Galway County Council and Transport Infrastructure Ireland, implement Green Public Procurement, and specify low carbon construction methods and low carbon cement material as far as practicable in projects.

As outlined in Section 17.6.2, measures are proposed to minimise as far as practicable the embodied carbon associated with the Project and to provide for the use of low carbon construction methods and low carbon cement material. Further, the Project is required to follow Government of Ireland procurement guidance to public bodies to promote the reduction of embodied carbon in publicly supported construction projects and construction materials[3].

[3] Procurement guidance for public bodies: Reducing embodied carbon in construction - DETE (enterprise.gov.ie)

Therefore, the construction and maintenance of the N6 Galway City Ring Road is also consistent with these aspects of CAP24.

17.11.1.3 The most recent approved national long term climate action strategy

As described in Section 17.2.2, Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction 2024 (the Strategy) is the most recent approved national long term climate action strategy. The Strategy relies upon measures outlined in the Climate Action Plan to limit emissions growth, but states that challenges remain beyond 2030 due to continued population / economic growth which may stimulate greater transport activity and demand.

The 'Obligations under Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended) and submissions in relation to the Climate Action Plan 2024' Report concludes that, when the proposed N6 GCRR is delivered as an integral part of the GTS and alongside a series of demand management measures identified in CAP24, there will be a 43% reduction in carbon emissions from transport by 2030 within the area of influence of the proposed N6 GCRR when compared to 2018 levels. This aligns with the Strategy through limiting emissions despite population growth. Refer to Section 17.5.2.2.2 for further details.

The Strategy states that achieving a fully decarbonised industry sector will require 'driving material efficiency in construction to reduce embodied anergy in materials'. As outlined in Section 17.6.2, measures are proposed to minimise as far as practicable the embodied carbon associated with the Project and to provide for the use of low carbon construction methods and low carbon cement material. The Project will also comply with the requirements of Government procurement guidance which sets out to promote the reduction of embodied carbon in publicly supported construction projects, and in particular the procurement of cement and concrete.

17.11.1.4 The most recent approved national adaptation framework and approved sectoral adaptation plans

As outlined in Section 17.2.2, Ireland's second statutory National Adaptation Framework was published on 5 June 2024. The NAF sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. An assessment of the climate change vulnerability of the Project is included in Section 17.5.2.2.2. As no significant adverse effects will arise in this regard, it can be concluded that the Project is consistent with the most recent approved national adaptation framework in that it ensures that the proposed infrastructure is safeguarded from the impacts of climate change.

The Transport Climate Change Sectoral Adaptation Plan was published in 2019. The Plan describes the main features of the Irish transport sector. The Plan identifies the key vulnerabilities in the transport network and looks to promote greater resilience to safeguard its continued operation. It can be concluded that the Project is consistent with the most recent approved sectoral adaptation Plan in that it ensures that the proposed infrastructure is safeguarded from the impacts of climate change.

17.11.1.5 The furtherance of the national climate objective

The National Climate Objective, as set out in Section 3(1) of the Climate Act is that*: "The State shall, so as to reduce the extent of further global warming, pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy..."*

The 'Obligations under Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended) and submissions in relation to the Climate Action Plan 2024' Report concludes that, when the proposed N6 GCRR is delivered as an integral part of the GTS and alongside a series of demand management measures identified in CAP24, there will be a 43% reduction in carbon emissions from transport by 2030 within the area of influence of the proposed N6 GCRR when compared to 2018 levels. This aligns with the furtherance of the national climate objective by transitioning to a climate neutral economy. The Project is designed to be climate resilient. The vulnerability of the Project is assessed in Section 17.5.2.2.2.

This updated EIAR as a whole provides an assessment of the Project from an environmentally sustainability aspect and Chapter 8 contains an assessment of biodiversity effects.

17.11.1.6 The objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State

The 'Obligations under Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended) and submissions in relation to the Climate Action Plan 2024' Report describes the impact that the Project will have on the performance of the road network, when implemented alongside demand management measures to achieve CAP24 targets. The report states that, when the proposed N6 GCRR is delivered as an integral part of the GTS and alongside a series of demand management measures identified in CAP24, there will be a 43% reduction in carbon emissions from transport by 2030 within the area of influence of the proposed N6 GCRR when compared to 2018 levels. The results of the assessment indicate that the delivery of the proposed N6 GCRR as an integral part of the GTS alongside the measures set out in CAP24 and other national level measures, contributes significantly towards the achievement of these national level targets.

It is noted that the design speed for the proposed Project at 100km/hr is less than the 120km/hr that usually applies to motorway schemes, further mitigating emissions.

A number of construction measures are described in Section 17.6 which will also have the effect of mitigating greenhouse gas emissions, including the specification of low carbon concrete and recycled steel.

An assessment of the climate change vulnerability of the Project is included in Section 17.5.2.2.2. As no significant adverse effects will arise in this regard, it can be concluded that the Project is consistent with adapting to the effects of climate change.

17.11.1.7 Summary of consistency with the plans, strategies, and objectives specified in Section 15

The assessment of the proposed Project when combined with the Galway Transport Strategy and CAP24 demonstrates consistency with each matter specified in Section 15 during the operational phase of the Project. Refer to the 'Obligations under Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended) and submissions in relation to the Climate Action Plan 2024' Report for further details.

Mitigation measures are proposed during the construction phase to mitigate greenhouse gas emissions in accordance with the matters specified in Section 15, these include the use of low carbon cement and recycled steel.

The Project is consistent with adapting to the effects of climate change which is consistent with the matters specified in Section 15.

17.12 Summary

The potential effects of the proposed Project on climate were assessed for both the construction and operational phases by considering emissions from changes in traffic movements (construction and operational) and embodied carbon from materials likely to be required during construction and maintenance. Potential emissions were considered in the context of Ireland's carbon targets and the Climate Act.

The operational phase assessment also included determining the vulnerability of the proposed Project to climate change.

To quantify the construction and maintenance phase embedded carbon, the TII Carbon Tool (TII 2022) was used in the assessment. This tool has the ability to quantify carbon in infrastructure projects using Ireland-specific emission factors, and data, where available, and considers embodied carbon due to construction materials and associated transportation.

Operational phased effects were assessed using the NTA ENEVAL tool. This allows the computation of the changes in carbon emissions due to the redistribution of traffic as a result of the proposed Project.

The total CO_{2eq} predicted to be generated by the proposed Project through all phases of construction, is expected to be 0.7% of Ireland's transport budget for 2030 ($6MtCO_{2eq}$). This is expected to result in short-term major adverse effects on climate in the absence of mitigation. A number of mitigation measures are proposed for the construction activities to reduce effects on climate, including the use of ground granulated blast furnace slag (GGBS), recycled steel, minimising wastage of materials due to poor timing or over ordering on site, maximising recycling and souring materials locally. The proposed Project is expected to

have a permanent moderate adverse residual effect on climate during over its lifecycle following the implementation of construction phase mitigation.

The level of impact assigned to the operational phase remains permanent moderate adverse pre and post mitigation as no Project level mitigation measures are proposed (only design-led mitigation). However, this effect is likely to reduce over time due to the implementation of measures subscribed by the EU Commission and CAP 24. In addition, the decarbonisation of the grid will reduce indirect carbon emissions from electric vehicles over time.

The EU Technical guidance on climate proofing of infrastructure in the period 2021-2027 advises that, as Projects in isolation are likely to result in an increase in CO_{2eq} emissions, Projects should be considered in the context of the plan from which they arise. On this basis, an assessment of emissions without the Project, GTS and CAP24 is compared to emissions with the Project, GTS and CAP24. An 8% decrease in CO_{2eq} emissions due the predicted traffic changes on the road network in 2030 is expected to arise.

The 'Obligations under Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended) and submissions in relation to the Climate Action Plan 2024' Report concludes that when the Project is delivered as an integral part of the GTS and alongside a series of demand management measures identified in CAP24, there will be a 43% reduction in carbon emissions from transport by 2030 within the area of influence of the Project when compared to 2018 levels. This aligns with the furtherance of the national climate objective.

17.13 References

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