11. Climate and Carbon

11.1 Introduction

11.1.1 Chapter 11 of the 2021 EIAR has been updated to reflect the changes described in Chapter 1: Introduction of this EIAR Supplement, including the change in air traffic forecasts. It also takes account of updated guidance presented in IEMA's (the Institute of Environmental Management and Assessment) 'Guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance' (dated February 2022). In addition, the Climate Action and Low Carbon Development (Amendment) Act 2021 has made changes to section 15 of the Climate Action and Low Carbon Development Act 2015 and the Government has published its latest Climate Action Plan 2023. Account is taken of both the legislative and policy changes.

11.1.2 The EIA Directive 2014/52/EU[1] describes the importance of considering climate change and greenhouse gas (GHG) emissions within EIAs: "*Climate change will continue to cause damage to the environment and compromise economic development. In this regard, it is appropriate to assess the impact of projects on climate (for example greenhouse gas emissions) and their vulnerability to climate change.*" (Section 13)

11.1.3 This chapter of the EIAR reports the findings of an assessment of the likely significant effects on GHG emissions as a result of the proposed Relevant Action. Overall, the Proposed Scenario would allow for an increase in the number of flights taking off and/or landing at Dublin Airport between 23:00 and 07:00 in accordance with the annual night-time noise quota and this also results in a faster return to 32mppa than in the Permitted Scenario. Between 2023 and 2026 there would be more passengers using the airport in the Proposed Scenario, which reaches the 32mppa Cap in 2024. However, by 2026 the 32mppa Cap will also have been reached in the Permitted Scenario, meaning that the return to the pre-Covid-19 passenger throughput will take approximately two years longer than in the Proposed Scenario.

11.1.4 The scope of the GHG assessment includes the change in GHG emissions resulting from the variation in Air Traffic Movements (ATMs) reported in the aircraft schedule developed by Mott MacDonald. GHG emissions from ATMs that have been considered within this assessment include those from the Landing and Take-Off (LTO) cycle (i.e., activities including approach/ landing, taxiing, take-off and climb (up to 3,000 feet), including Auxiliary Power Units (APUs)[2] where applicable, and also during the Climb, Cruise and Descent (CCD) phase for departing flights. Additional surface access passenger journeys (i.e., ground travel to and from the airport) as a result of the proposed Relevant Action are also included within the scope of the assessment. Indirect impacts, such as the potential increase in emissions associated with airport operations, have been considered but not modelled in this assessment, as outlined in Section 11.3.

11.2 Legislation and Planning Policy Context

11.2.1 The various policies, standards and guidance described in this section outline national and international ambitions and targets for reducing GHG emissions and demonstrate the need for effective GHG reduction measures to be built into future development.

11.2.2 In line with these ambitions and targets, this assessment evaluates the GHG impact of the proposed Relevant Action in the context of the projected National Emissions Inventories for Ireland[3] to provide some context and scale in relation to Ireland's trajectory towards decarbonisation.

11.2.3 Section 11.6 outlines the ways in which GHG emissions as a result of the proposed Relevant Action have been or will be avoided, prevented, reduced and offset by various means.

[1] European Union (EU), (2014); Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014: Amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment.
[2] An APU is a device on an aircraft that provides power for functions other than propulsion, allowing the aircraft to operate autonomously without reliance on ground support equipment such as a ground power unit, an external air-conditioning unit or a high-pressure air start cart.
[3] Environmental Protection Agency (EPA), (2022); Ireland's GHG Emissions Projections 2021 – 2040.

11.2.4 Section 15(1) of the Climate Action and Low Carbon Development Act, 2015, as amended by Section 17 of the Climate Action and Low Carbon Development (Amendment) Act of 2021, provides as follows:

"(1) A relevant body 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."

National Planning Policy

Climate Action and Low Carbon Development Acts 2015 to 2021

11.2.5 The Climate Action and Low Carbon Development Acts 2015 to 2021[4] contain National Climate Objective to '*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 Bill also seeks to achieve a 51% reduction in Ireland's emissions by the end of the decade (2030).As set out in 11.2.4, a relevant body must , as far as practicable, perform its functions in a manner consistent with, *inter alia,* the furtherance of the national climate objective and the most recent approved climate action plan.

11.2.6 The projected National Emissions Inventories for Ireland[5], used within this assessment to evaluate the impact of GHG emissions associated with the proposed Relevant Action on Ireland's ability to meet its carbon reduction targets, were developed in line with Ireland's Climate Action Act and Low Carbon Development Acts 2015 to 2021, and the Climate Action Plan 2021 which set a national climate objective to achieve a reduction of 51% in total emissions over the period 2018 to 2030. These are the most recent projections available.

11.2.7 The Climate Action and Low Carbon Development Acts 2015 to 2021 introduces;

- Ireland's 5 yearly carbon budgets, from 2021;
- A sectoral emissions ceiling within the limits of the carbon budget;
- The preparation of a climate action plan;
- The preparation of a national long-term climate action strategy;
- The preparation of a national adaptation framework; and
- An expectation for local authority to develop Climate Action Plans for 5-year periods which specify the mitigation and adaptation measures to be adopted by the local authority.

Climate Action Plan (2023)

11.2.8 The Climate Action Plan 2023 (CAP23) is the second annual update to Ireland's Climate Action Plan 2019. This plan is the first 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.

[4] Department of the Environment, Climate and Communications, (2021); Climate Action and Low Carbon Development (Amendment) Act 2021.
[5] Environmental Protection Agency (EPA), (2022); Ireland's GHG Emissions Projections 2021 – 2040.

11.2.9 This plan sets out the roadmap to deliver on Ireland's climate ambition, providing a detailed roadmap to achieve a 51% reduction in GHG emissions by 2030 and achieve net zero emissions by no later than 2050.

11.2.10 In order to meet these targets, there must be transformative behavioural and systemic change in the transport sector. CAP 23 outlines how the growing demand for transport must be met in a sustainable manner by prioritising new public transport schemes, like CACR, over road projects.

11.2.11 Specifically, in relation to the transport sector, key actions include a 20% reduction in total vehicle kilometres, a reduction in fuel usage, and significant increases to sustainable transport trips and modal share.

11.2.12 In line with the Climate Action Act 2021, and the Climate Action Plan 2021 and 2023, the reduction target used for the purposes of this assessment is a 51% reduction in GHG emissions by 2030. While the assessment undertaken within this chapter does not include 2050, Ireland's target of net zero by 2050 must be taken into account.

Project Ireland 2040: National Planning Framework (2018)

11.2.13 The National Planning Framework[6] discusses the need to reduce GHG emissions.

11.2.14 The Framework also describes the importance of progressively electrifying mobility systems, moving away from "*polluting and carbon intensive propulsion systems to new technologies*".

National Development Plan 2018 – 2027

11.2.15 The National Development Plan 2018 – 2027 sets out the investment priorities that will underpin the implementation of the National Planning Framework (above). The Development Plan emphasises the need for "investment to support the achievement of climate action objectives and discourage investment in high-carbon technologies".

National Aviation Policy 2015

11.2.16 The National Aviation Policy[7] describes GHG emissions as a key issue in relation to aviation and states that while fuel efficiency has increased significantly in recent decades (70% increase in the last 40 years), these improvements are being "*offset by the increase in activity over the period*".

11.2.17 It is recognised that aviation emissions will need to be limited in the future in line with European and global emissions trading/offsetting initiatives, and that "*measures such as technology improvements in aircraft and engine design will continue to play an important role in combatting aviation emissions*".

National Mitigation Plan (2017)

11.2.18 The National Mitigation Plan[8] is seen as a "*critical first step towards decarbonising [Ireland's] economy*". The Plan outlines the overall framework for policy on climate action in Ireland, before then reviewing and outlining mitigation measures for the following key sectors:

- Electricity generation;
- The built environment;
- Transport; and
- Agriculture, forest and land use.

[6] Department of Communications, Climate Action and Environment, (2018); Project Ireland 2040: National Planning Framework.
[7] Department of Transport, Tourism and Sport, (2015); A National Aviation Policy for Ireland.
[8] Department of Environment, Climate and Communications, (2017); National Mitigation Plan.

Local Planning Policy

Fingal Development Plan 2023 – 2029

11.2.19 The Fingal Development Plan[9] sets out the framework to guide future development within Fingal. Climate Action is included as an overarching and cross-cutting theme across this Plan with a strong emphasis on reduction in energy demand and emissions through a combination of effective mitigation and adaptation responses to climate change. In particular, the plan includes specific climate action targets relating to Dublin Airport including the increasing use of more sustainable transport modes to access Dublin Airport, amongst others.

Dublin Airport Local Area Plan 2020

11.2.20 The Local Area Plan (LAP)[10] sets out the main challenges and opportunities faced by the airport over the plan period. Within Chapter 5: Transition to a Low Carbon Economy, the LAP highlights the importance of the role of International Civil Aviation Organisations (ICAO) and the Carbon Offset and Reduction Scheme for International Aviation (CORSIA), among other key policy documents, in addressing carbon emissions. The LAP "*seeks to pursue climate mitigation in line with global and national targets and support the transition towards a low carbon economy by seeking to reduce CO_2 emissions at the Airport*"

Fingal County Council Climate Change Action Plan 2019 – 2024

11.2.21 The FCC Climate Action Plan[11] looks at the current and future climate change impacts and GHG emissions levels within the county and features a range of actions to reduce these impacts across five key areas – Energy and Buildings, Transport, Flood Resilience, Nature-Based Solutions and Resource Management. A key target of the Climate Action Plan is to achieve a 40% reduction in the Council's greenhouse gas emissions by 2030.

11.2.22 The Council also "*recognises the Climate Emergency as declared by the Dáil and commits itself in this plan to prioritising mitigation of, and adaptation to, climate change across its functions*".

Greater Dublin Area Transport Strategy 2022-42

11.2.23 This Transport Strategy[12] commits to meeting Ireland's targets of 51% emissions reduction by 2030 and setting a path towards a zero net-emissions scenario by 2050 including through improving public transport access to Dublin Airport.

Other Relevant Policy, Standards and Guidance

The Paris Agreement

11.2.24 The Paris Agreement[13] is a legally binding international treaty on climate change, adopted in 2015 by 196 countries including Ireland. The goal of the Paris Agreement is to hold the "*increase in the global average temperature to well below 2°C above pre-industrial levels and [pursue] efforts to limit the temperature increase to 1.5°C above pre-industrial levels*". The Paris Agreement provides a framework for reducing GHG emissions and also increasing resilience to future climate change impacts.

The Greenhouse Gas Protocol

11.2.25 The Greenhouse Gas Protocol[14] is a "*global standard for companies and organizations to measure and manage their GHG emissions and become more efficient, resilient, and prosperous*", providing a standardised methodology for GHG quantification and management. The GHG Protocol carbon quantification principles have been adhered to when undertaking the GHG calculations as part of the lifecycle GHG impact assessment presented within this chapter.

[9] Fingal County Council, (2023); Fingal Development Plan 2023 – 2029
[10] Fingal County Council, (2020); Dublin Airport Local Area Plan 2020.
[11] Fingal County Council, (2019); Fingal County Council Climate Change Action Plan 2019-2024.
[12] National Transport Authority, (2022); Greater Dublin Area Transport Strategy (2022 – 2042).
[13] United Nations Framework Convention on Climate Change (UNFCCC), (2015); The Paris Agreement.
[14] World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD), (2004); The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard.

European Union Emission Trading System

11.2.26 The aim of the European Union Emission Trading System (EU ETS)[15] is to help EU Member States achieve their commitments to limit or reduce greenhouse gas emissions in a cost-effective way by allowing participating installations to buy or sell tradeable emissions allowances. This means savings are made where it is most financially viable to do so.

11.2.27 CO_2 emissions from aviation have been included in the EU Emissions Trading System since 2012. Under the EU ETS all airlines operating in Europe (both European and non-European airlines) are required to monitor, report and verify their emissions from qualifying flights within Europe, and to surrender allowances against those emissions. They currently receive a free allocation of tradeable allowances covering a certain level of permitted emissions from their flights each year, although this free allocation is subject to an annual reduction factor, which is due to be phased out entirely by 2026[16].

11.2.28 The EU ETS is discussed further in Section 11.6 in relation to limiting emissions, including from aviation, within the trading system.

Civil Aviation Organisation Carbon Offsetting Reduction Scheme for International Aviation

11.2.29 International Civil Aviation Organisation (ICAO) Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)[17] has been developed to address the increase in total CO_2 emissions from international aviation, with the aim of achieving no net increase in aircraft CO_2 emissions from its implementation date of 2021.

11.2.30 As it currently stands, CO_2 emissions from international aviation in 2019 and 2020 will be used to set the CORSIA baseline for carbon neutral growth post-2020[18]. In any year beyond this point, any international aircraft operators CO_2 emissions covered by the scheme exceeding the baseline quantity will be required to be offset.

11.2.31 CORSIA will be implemented in phases, starting with participation of countries on a voluntary basis until 2026, followed by the second phase (from 2027 to 2035), whereby participation is mandatory for all countries except those which are exempt (i.e., Least Developed Countries (LDCs), Small Island Developing States (SIDS) and Landlocked Developing Countries (LLDCs)).

11.2.32 CORSIA is discussed further in 11.6 in relation to offsetting international aviation emissions.

European Green Deal

11.2.33 The European Green Deal[19] is a set of policy initiatives by the European Commission, with the aim of reducing climate change and environmental degradation across Europe. A set of actions have been identified across a number of key sectors, including 'Climate'. The European Green Deal" aims *to make Europe climate neutral by 2050*" and states that "*to achieve our decarbonisation objectives, emissions must be reduced in all sectors, from industry and energy, to transport and farming*".

DEFRA Guidance

11.2.34 The DEFRA Greenhouse Gas Reporting: Conversion Factors 2023 provides a comprehensive set of factors for converting various activities and emissions into equivalent greenhouse gas (GHG) emissions. These conversion factors allow organisations to calculate and report their GHG emissions accurately and consistently, covering sectors such as energy, transport, waste management, and agriculture. The document includes updated emission factors for different fuels (including aviation), electricity generation,

[15] European Union (EU), (2018); Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814 (Text with EEA relevance).
[16] European Commission, (2022); European Green Deal: new rules agreed on applying the EU emissions trading system in the aviation sector. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_7609 (Accessed 10/07/2023).
[17] International Civil Aviation Organization (ICAO), (2016); Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).
[18] Initially, the intention was for the baseline to be set based on emissions from international aviation in 2020. However, due to the global COVID-19 pandemic resulting in significantly reduced international aviation operations in 2020, the CORSIA emissions baseline was adjusted to 2019 international aviation emissions. Without this adjustment, the baseline would have been much lower than expected, which would "*disrespect the originally agreed intention and objectives of ICAO's 193 Member States when they adopted CORSIA in October 2016*", according to ICAO".
[19] European Commission, (2019); The European Green Deal.

waste disposal methods, and agricultural practices, enabling businesses and policymakers to assess their environmental impact and develop effective strategies for reducing GHG emissions.

11.2.35 This UK guidance has been used in the absence of relevant GHG emission factor data being available in Ireland. Furthermore, The DEFRA Conversion Factors are appropriate to use in Ireland in the absence of Ireland-specific emission factors because they provide a standardised and widely recognised framework for calculating and reporting GHG emissions, ensuring consistency and comparability across different sectors and allowing for a meaningful assessment of environmental impact.

11.3 Assessment Methodology

11.3.1 This section presents the following:

- Information sources that have been consulted throughout the preparation of this chapter;
- Details of consultation undertaken with respect to GHG emissions;
- The methodology behind the assessment of effects of GHG emissions, including the criteria for the determination of sensitivity of receptors and magnitude of change from the Permitted Scenario;
- An explanation as to how the identification and assessment of potential effects of GHG emissions has been reached; and
- The significance criteria and terminology for the assessment of residual effects of GHG emissions.

Methodology for Climate Change Adaptation

11.3.2 A climate change resilience review looks at the impact of climate change on the proposed Relevant Action and provides an evaluation of the resilience of the proposed Relevant Action to such climate risks However, a climate change resilience review has not been undertaken as part of this chapter as there are no physical changes to the runway and therefore no potential for new climate risks to be created, that'd require additional adaptation measures. Given that there are no physical changes to the North Runway as a result of the proposed Relevant Action, and no obvious means by which climate change would affect the proposed Relevant Action, such an assessment is not necessary or appropriate.

Methodology for Greenhouse (GHG) Assessment

Methodology for Determining Baseline Conditions and Sensitive Receptors

11.3.3 The GHG assessment study area considers all GHG emissions from fuel used by aircraft during the LTO and CCD phases (collectively referred to as ATMs) and GHG emissions from surface access passenger journeys under the Permitted and Proposed Scenarios for each of the assessment years, 2025 and 2035.

11.3.4 As defined by ICAO, the LTO cycle consists of four phases of aircraft operations: approach/ landing, taxi, take-off and climb (up to 3,000 feet), while the CCD phase consists of the climb, cruise and descent stages for departing flights only (Figure1-1).

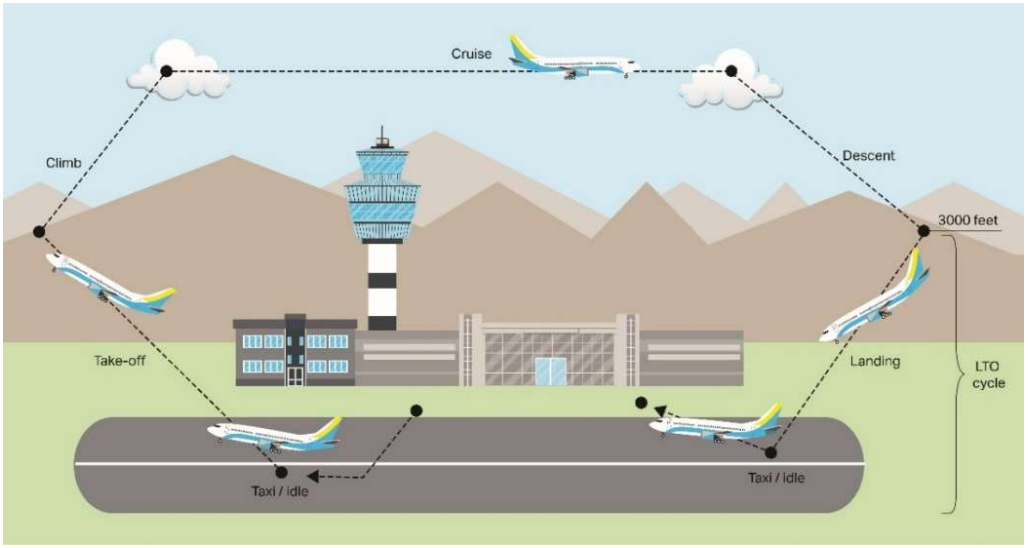

Figure 11 1: Air Traffic Movement Phases, including Landing and Take-Off and Climb, Cruise and Descent Phases

11.3.5 Only the ATMs (LTO and CCD phases) of departure flights are considered within this assessment, and not the ATMs of arriving flights, to avoid double counting of aviation emissions between airports. It is assumed that the emissions associated with the arriving flights will be accounted for within the carbon accounts of the airports of origin.

11.3.6 The baseline for the GHG emissions assessment is the Permitted Scenario for each assessment year (i.e., the GHG emissions associated with the forecast ATMs and surface access passenger journeys), without the proposed Relevant Action.

11.3.7 The global climate has been identified as the receptor for the purposes of the GHG emissions assessment.

11.3.8 There is currently no published standard definition for receptor sensitivity to GHG emissions. For the purposes of this assessment, the sensitivity of the receptor has been defined as 'high' (the Irish National Emissions Inventory[20], used here as a proxy for the global climate to contextualise the scale of the GHG impact). The rationale for this approach is the extreme importance of limiting global warming to below 2°C this century as broadly asserted by the International Paris Agreement and the climate science community. Additionally, a recent report by the Intergovernmental Panel on Climate Change (IPCC) highlighted the importance of limiting global warming below 1.5°C[21].

Methodology for Determining Construction Effects

11.3.9 The proposed Relevant Action will result in no changes as a result of construction. The North Runway opened in 2022 On that basis, the assessment of construction phase impacts on GHG emissions are not considered in this EIAR.

[20] While it is recognised that the Irish National Emissions Inventory does not include emissions from international aviation, it has been used here as a proxy for the global climate to contextualise the scale of the GHG impact in relation to Ireland's projected trajectory towards decarbonisation.
[21] The Intergovernmental Panel on Climate Change (IPCC), (2018); Global warming of 1.5°C. An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

Methodology for Determining Operational Effects

11.3.10 There is an increase in Air Traffic Movements (ATMs) and passenger numbers under the Proposed Scenario relative to the Permitted Scenario in the 2025 Assessment Year. This reflects a faster recovery back to the 32mppa Cap which would occur under the Proposed Scenario and merely brings forward by approximately two years the increase which would happen anyway in the Permitted Scenario. In the 2035 Assessment Year, the passenger numbers are the same.

11.3.11 There is no new airport infrastructure proposed as part of the proposed Relevant Action. Emissions from the operation of airport buildings and assets are therefore assumed to remain similar to the current operations. It is expected that any increase in emissions from the operation of airport buildings and assets due to the short-term increase passenger numbers as a result of the proposed Relevant Action will be counterbalanced by the decarbonisation of the national grid and further carbon reductions realised in line with the Applicant's energy reduction targets.

11.3.12 The Applicant's Carbon Reduction Strategy[22] sets out how GHG emissions will be reduced on an airport-wide basis[23]. However, for the purposes of the EIAR it is assumed that any changes to building emissions as a result of the proposed Relevant Action will not have a material impact on the overall carbon footprint and the outcome of this assessment, given that heating and lighting will still be required for the whole airport, irrespective of the precise number of passengers using the airport each year. Emissions associated with operation of airport buildings are therefore not assessed any further within this EIAR.

11.3.13 Based on the scope of the proposed Relevant Action, the assessment of the impacts of ATMs and additional surface access passenger journeys on GHG emissions have been included in the assessment.

11.3.14 In line with the approach adopted for the Aviation Emissions Calculator by the European Monitoring and Evaluation Programme (EMEP) and the European Environment Agency (EEA)[24], the GHG emissions associated with ATMs will be reported as tonnes of carbon dioxide equivalent (tCO_{2e}). Additionally, the GHG emissions associated with the additional surface access passenger journeys will be reported as tCO_2e, accounting for the following seven Kyoto Protocol GHGs in line with The GHG Protocol:

1. Carbon dioxide (CO_2).
2. Methane (CH_4).
3. Nitrous oxide (N_2O).
4. Sulphur hexafluoride (SF_6).
5. Hydrofluorocarbons (HFCs).
6. Perfluorocarbons (PFCs).
7. Nitrogen trifluoride (NF_3).

11.3.15 Other aircraft engine emissions (oxides of nitrogen (NO_x) and methane (CH_4)), and contrail and cirrus cloud formation have a climate change effect when released at high altitudes[25]. It has been suggested by researchers that this additional effect almost doubles aviation's contribution to climate change compared to the CO_2 emissions alone[26]. However, the science is uncertain, and these additional impacts are not included in EU or international policy making at present. Therefore, these effects are not considered when calculating ATM emissions.

11.3.16 Projected ATM data developed by Mott MacDonald (shown in Table 11-1) have been provided for 2025 and 2035 for the Proposed Scenario and Permitted Scenario. Emissions from ATMs have been calculated for each of these assessment years using the Aviation Emissions Calculator, based on the

[22] dublin-airport-carbon-reduction-strategy.pdf (dublinairport.com)
[23] Fingal County Council has a duty under the Climate Action and Low Carbon Development Act 2015 to have regard to the most recent approved national mitigation plan.
[24] EMEP/ EEA, (2019); Aviation Emissions Calculator (accompaniment to the EMEP/ EEA air pollutant emission inventory guidebook, 2019, chapter 1.A.3.a Aviation).
[25] Lee, D., Fahey, D., Forster, P. et al., (2009); Aviation and Global Climate Change in the 21st Century. Atmospheric Environment 35: 3520-3537.
[26] Sausen, R., Isaken, I., Grewe, V. et al., (2005); Aviation Radiative Forcing in 2000: An Update on IPCC (1999). Meteorologische Zeitschrift 14(4): 555-561.

specific flight schedule and aircraft mix provided. As the aircraft schedules provided contain the projected mix of aircraft models for each of the assessment scenarios, future efficiency gains due to new aircraft models have been accounted for.

11.3.17 The calculator draws on the ICAO *Aircraft Engine Emissions Databank*, which contains information on exhaust emissions from various aircraft engines (provided by engine manufacturers). The calculator models emissions from various aircraft types based on their most frequently used engine types and average European taxi times provided by EUROCONTROL's Central Office of Delay Analysis (CODA).

Table 11-1: Permitted and Proposed Annual ATM Projections for each Assessment Year (000s)

Year	Scenario		
	Permitted	Proposed	Variation
2025	227	240	13
2035	228	240	0

11.3.18 The Aviation Emissions Calculator methodology does not account for APU use as the use of APUs is highly variable between airports. APU usage at individual airports may depend on site-specific APU restrictions, differences in fuel costs between APUs and alternative power sources, and availability of alternative power sources (e.g., due to proximity of the aircraft to the required airport infrastructure). To account for APU usage, a scaling factor[27] of 8% has been applied to the LTO emissions calculated using the Aviation Emissions Calculator. This scaling factor is a conservative estimate, based on the contribution of APU emissions to overall LTO emissions reported in Heathrow Airport's emissions inventory between 2013 and 2017[28].

11.3.19 Data from Heathrow Airport has been used here as the specific inventory data required for this calculation is not available for Dublin Airport over such a period (5 years), and there is very limited data or guidance available within the literature due to the high variability in APU usage between airports. As APU usage as a proportion of overall LTO emissions is publicly available for Heathrow Airport, this has been used as a proxy for Dublin. It is recognised that this may not be a completely accurate representation of the contribution of APU emissions at Dublin Airport, however both are major European, international airports, so it has been assumed that APU usage will be similar. As the APU usage only accounts for a small proportion of overall ATM emissions, it is not anticipated that any variation in APU use between Heathrow Airport and Dublin Airport will have an impact the overall outcome of the assessment.

11.3.20 The flight distance between Dublin Airport and each destination airport has been estimated for each flight route, and the emissions from each ATM modelled individually using the Aviation Emissions Calculator. To estimate the flight route distances, the direct distance was obtained from the Great Circle Mapper air distance calculator[29], and an 8% uplift was applied to CCD emissions to account for deviations from the direct route due to inclement weather conditions and stacking above airports, as per the Defra 2021 emissions factor calculation methodology[30].

11.3.21 The 8% scaling factor from the Defra 2021 guidance has been applied here as it is the most up-to-date source available, and the guidance states that following recent analysis, this factor is deemed the most appropriate for flights arriving and departing in the UK. It is assumed that in the context of worldwide airport operations, operations at Dublin Airport would be similar enough to UK airports for this to also be applicable here. An alternative to this scaling factor is a factor of 10% as reported in the IPCC Aviation

[27] A scaling factor is a number which multiplies a quantity by a given amount to estimate another quantity based on the proportionate relationship between the two aspects. In this case, LTO emissions have been scaled up to include an additional 8% of total LTO emissions to account for emissions from APU usage. The 8% factor is based on the relationship between LTO and APU emissions at Heathrow Airport.
[28] Heathrow Airport Limited, (2018); Heathrow Airport 2017 Emissions Inventory.
[29] The Great Circle Mapper, (2020); Air Distance & Flight Time Calculation [online]. Available at: https://www.greatcirclemapper.net/
[30] Department for Environment, Food and Rural Affairs and the Department of Business, Energy and Industrial Strategy, (2018); 2021 Government greenhouse gas conversion factors for company reporting - Methodology Paper for Conversion factors Final Report

and the Global Atmosphere report (1999)[31], however considering the age of the underlying data built into the IPCC scaling factor and how much the aviation industry has changed over the last 20 years, the Defra scaling factor is considered a more appropriate and accurate estimate.

11.3.22 Projected passenger numbers for each of the assessment years reported in the Dublin Airport Operating Restrictions report[32] have been used to estimate GHG emissions associated with additional surface access passenger journeys, based on assumptions[33] made around mode of travel and transportation distances, and applying the relevant Defra 2023 emissions factors[34].

Significance Criteria

11.3.23 Institute of Environmental Management and Assessment (IEMA) guidance on Assessing GHG Emissions and Evaluating their Significance (2022)[35] states that the following three principles need to be considered when evaluating the significance of GHG impacts:

- All project GHG emissions will contribute to climate change;
- Climate change has the potential to lead to significant environmental consequences that may affect all topics in the EIA Directive (e.g., Biodiversity, Water, Landscape, Geology, Air Quality, Human Health); and
- GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such that any GHG emissions or reductions from a project might be considered significant.

11.3.24 Based on these principles, the IEMA guidance states that "*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".*

11.3.25 The guidance has identified two major considerations when assessing the significance of a project's GHG emissions: alignment to a trajectory towards net zero by 2050, and mitigation of GHG emissions. It is down to the professional judgment of the practitioner to determine how best to contextualise and assess the significance of a project's GHG impact.

Alignment to 2050 Net Zero Trajectory

11.3.26 The IEMA guidance 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 by 2050".* The trajectory of GHG emissions associated with the proposed Relevant Action has therefore been factored into the assessment criteria and will be considered in the context of Ireland's trajectory to net zero by 2050 (in line with the Climate Action and Low Carbon Development Acts 2015 to 2021).

GHG Mitigation

11.3.27 The IEMA guidance also emphasises the importance of implementing GHG mitigation measures to help minimise GHG emissions, regardless of the magnitude of emissions, and states that the level of mitigation should be used to assess the significance of GHG emissions. GHG mitigation has therefore been considered in the context of the proposed Relevant Action and will be factored into the assessment criteria for the GHG assessment.

11.3.28 Based on the above two considerations, and in line with criteria outlined in the IEMA guidance, the following significance table, as shown in Table 11., will be used to assess the significance of GHG emissions arising as a result of the proposed Relevant Action.

[31] Intergovernmental Panel on Climate Change (IPCC), (1999); Aviation and the Global Atmosphere: A Special Report of IPCC Working Groups I and III.
[32] Mott MacDonald, Dublin Airport Operating Restrictions Quantification of Impacts on Future Growth Updated analysis in response to the ANCA RFI (2021)
[33] Specific assumptions are outlined in the *Limitations and Assumptions* section below.
[34] Department for Environment, Food and Rural Affairs and the Department of Business, Energy and Industrial Strategy, (2020); UK Government GHG Conversion Factors for Company Reporting.
[35] Institute of Environmental Management & Assessment (IEMA) (2022). Institute of Environmental Management & Assessment Guide: Assessing Greenhouse Gas Emissions and Evaluating their Significance.

Table 11.1: Significance of Effects for GHGs Impact Assessment

Significance Level	Effect	Description
Significant	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; and • No meaningful 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.
Significant	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.

11.3.29 Sectoral, local, or national carbon budgets can be used, as available and appropriate, to contextualise a project's GHG impact. IEMA guidance states that the significance of a project should not be determined based on the magnitude of the GHG emissions and whether it will release GHG emissions. It should be concluded by establishing if it will contribute to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero.

Methodology to Assess the Significance of Effects

11.3.30 The significance of effect has been determined based on the variation of GHG emissions between the Permitted and Proposed Scenarios. The difference between the GHG emissions associated with these scenarios for each of the Assessment Years (2025 and 2035) is considered to represent the change in emissions arising as a result of the proposed Relevant Action and therefore equates to the GHG impact.

11.3.31 The GHG impact of the proposed Relevant Action has been compared against Ireland's projected total National Emissions Inventories for each of the assessment years, and further contextualised against Ireland's projected total Transport Emissions Inventory. Ireland's transport emissions inventory projections produced by the EPA[36] provide a trajectory to 2040 under a 'With Existing Measures' scenario and 'With Additional Measures' scenario (refer Figure 11-1 below). While the EPA inventory projections do not include international aviation emissions, they do include domestic aviation emissions and help to contextualise the potential impact of the proposed Relevant Action by providing a sense of scale. The more ambitious of the two scenarios (With Additional Measures) has been used here as a

[36] Environmental Protection Agency, Ireland's Greenhouse Gas Emissions Projections 2019-2040 EPA-Ireland's-GHG-Projections-Report-2021-2040v4.pdf

proxy for the trajectory that the aviation sector should be aiming for to help Ireland meet its new zero ambitions.

11.3.32 Specific mechanisms for reducing international aviation emissions (e.g., EU ETS and CORSIA) are described in section 11.6 .

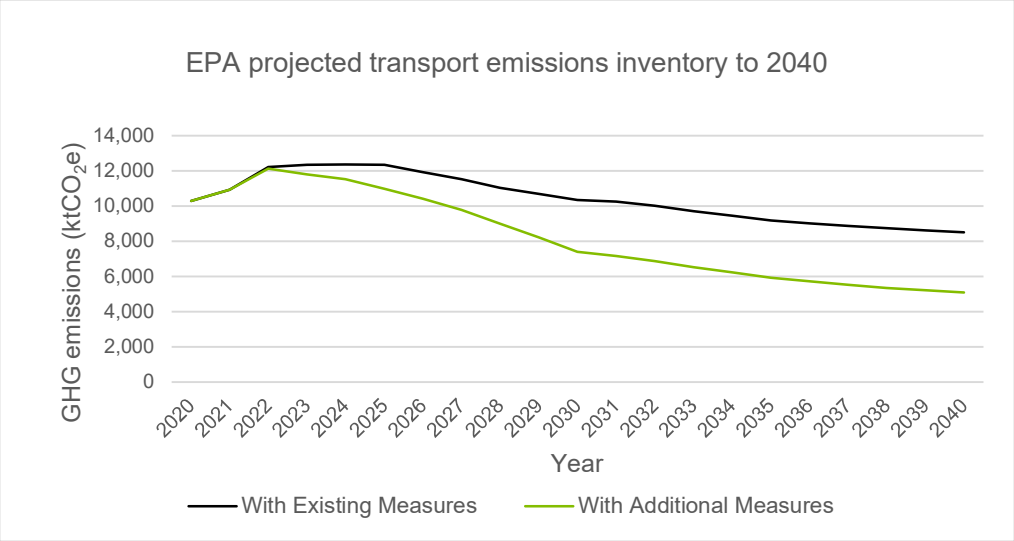

Figure 11-1 GHG emissions projections from the transport sector under the With Existing Measures and With Additional Measures scenarios out to 2040

Limitations and Assumptions

11.3.33 Only commercial flights have been included in the ATM GHG emissions calculations, while flights made by private aircraft have been excluded. It is anticipated that GHG emissions from private aircraft would not have a material impact on the overall GHG footprint.

11.3.34 Aircraft schedule forecasts (produced by Mott MacDonald) have been provided for a busy day (as defined within the replacement *Chapter 13: Aircraft Noise and Vibration* in this EIAR Supplement, and within the Mott MacDonald Report). The aircraft mix on the busy day schedule has been assumed to be representative of the aircraft mix throughout the year. To calculate annual emissions, the aircraft and ATM schedule produced by Mott MacDonald has been pro-rated up based on the number of ATMs for the busy day and the total annual ATMs.

11.3.35 Some aircraft models (typically newer models) were not available within the Aviation Emissions Calculator. For the A320neo and A321neo, the A320 and A321 models were used instead. These emissions were then pro rata-ed down based on the difference in emissions intensity between the relevant models, as calculated using the Atmosfair Flight Emissions Calculator[37]. Where certain aircraft models were not available within either the Aviation Emissions Calculator or the Atmosfair Flight Emissions Calculator the closest available model produced by the same manufacturer was selected as a proxy, for example the E190-2 aircraft has been modelled using the E190 aircraft (see Appendix 11A for a full list of aircraft model substitutions).

11.3.36 For some flights, the total journey length reported in the aircraft schedule exceeded the range limit of the proxy aircraft selected. In this instance, emissions were calculated for the maximum available journey length for the proxy aircraft within the Aviation Emissions Calculator, then scaled up proportionately to account for the total journey distance.

11.3.37 For some flights, the total journey length reported in the aircraft schedule was shorter than the available range limit of the aircraft selected in the Aviation Emissions Calculator. In this instance, the journey length was doubled for the aircraft, and the associated emissions for this doubled journey length were

[37] Atmosfair, (2020); Calculate Flight Emissions [online]. Available at: https://www.atmosfair.de/en/offset/flight/

calculated using the Aviation Emissions Calculator. These emissions were then halved to provide the emissions for the original journey length.

11.3.38 As APU usage is difficult to estimate accurately for individual airports due to the highly variable nature, the calculations for the GHG emissions associated with APU usage assume an 8% uplift on total LTO emissions excluding APU (as calculated using the Aviation Emissions Calculator). This uplift is considered to represent a conservative approach (i.e. the 5-year average APU uplift from the Heathrow Airport data has been rounded up, so may be over-estimating APU emissions).

11.3.39 An 8% uplift has also been applied to CCD emissions to account for deviations from the ideal flight route due to inclement weather conditions and stacking above airports. This is in line with the methodology described by Defra.

11.3.40 No assumptions regarding future biofuel use have been factored into the ATM GHG emissions calculations due to uncertainty around the future supply and level of uptake of biofuels[38,39]. This is considered to represent a conservative approach.

11.3.41 Table 11-2 outlines the mode share percentages (in line with the mode shares used for the transport modelling presented in *Chapter 9: Traffic & Transport* of the 2021 EIAR), journey distances assumed, and Defra 2021 emissions factors applied for the calculation of GHG emissions associated with surface access passenger journeys. The mode share percentages reported are assumed to be the same for each of the Assessment Years. Any variation between these figures and actual mode share figures for each of the Assessment Years is not anticipated to have a material impact in the context of the overall footprint and is therefore not anticipated to affect the overall outcome of the assessment.

Table 11-2: Assumptions Made for the Calculation of GHG Emissions Associated with Surface Access Passenger Journeys

	Assumptions		
Transport mode	**Mode share**	**Assumed 2-way distance (km)**	**Emissions factor applied**
Bus	32.6%	60	Defra 2021 – Local bus (not London)
Taxi	25.3%	100	Defra 2021 – Large car – Unknown fuel
Car private	14%	100	Defra 2021 – Average car – Unknown fuel
Car rental	6.4%	100	Defra 2021 – Average car – Unknown fuel
Transfer	4.2%	60	Defra 2021 – Local bus (not London)
Other	1.4%	100	Defra 2021 – Average van (up to 3.5 tonnes) – Unknown fuel

11.4 Current State of the Environment

11.4.1 The current receiving environment is the global climate. For the purposes of the GHG impact assessment, the Irish National Emissions Inventory has been used as a proxy for the global climate to contextualise the scale of the GHG impact in relation to Ireland's contribution to global emissions.

11.4.2 The most recent emissions inventory for Ireland (2020), were reported in Ireland's National Inventory Report 2022[40] amounted to 57,716 kilotonnes of carbon dioxide emissions ($ktCO_2e$).

[38] The International Energy Agency (IEA) states that while the aviation industry demonstrates a strong commitment to sustainable alternative fuels such as biofuels, further technological developments are required before widespread uptake is realistic: https://www.iea.org/commentaries/are-aviation-biofuels-ready-for-take-off
[39] Sustainable Aviation, (2020); Sustainable Aviation Fuels Road-Map: Fuelling the future of UK aviation.
[40] Environmental Protection Agency (EPA), (2022); Ireland's National Inventory Report 2022: Greenhouse Gas Emissions 1990-2020

11.5 Future Receiving Environment

11.5.1 The Future Receiving Environment is the global climate during each of the assessment years. For the purposes of the GHG impact assessment, Ireland's projected National Emissions Inventories for each of the assessment years (under the With Additional Measures scenario[41]) have been used as a proxy for the global climate.

11.5.2 Ireland's projected National Emissions Inventories for 2024 (the first year in which 32mppa is expected to be reached with North Runway operational) and 2035 (an assessment year 10-15 years later, as requested by Fingal County Council), are presented in Table 11-7 below.

11.6 Environmental Design and Management

11.6.1 This section identifies further ways in which GHG emissions from aircraft ATMs have been or will be avoided, prevented, reduced and offset by various means.

11.6.2 Efficiencies have historically reduced the CO_2 intensity of aircraft, and these efficiencies are expected to continue. The estimated fuel efficiency benefits from switching to more fuel-efficient aircraft models in the future have been incorporated into this GHG assessment.

11.6.3 Fundamental to managing and controlling GHG emissions from the aviation sector are two market-based measures, the EU Emissions Trading System (EU ETS)[42] and Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)[43]. The majority of emissions from aircraft using the airport will fall under one of these two Schemes. The EU ETS provides a cap on the amount of carbon which participating airlines within intra-EU aviation can emit. Under the updated 'Fit for 55' EU policy[44], there is a requirement that ETS emissions must be cut by 62% by 2030 compared to 2005. Airlines receive a free allocation of allowances that will cover some of their emissions, but must buy emissions allowances at auction or the secondary market to cover the remainder. The available allowances place a cap on the total amount of GHGs that can be emitted across the EU ETS as a whole. The free allowances are to be phased out gradually with full auctioning to be implemented from 2026 under the 'Fit for 55' package. This puts a binding cap on the overall emissions within the ETS, including from airline operators. The cost to airline operators of purchasing carbon allowances will ultimate be reflected in the cost of tickets to passengers.

11.6.4 Emissions not falling under the EU ETS will be managed through CORSIA which aims for no net increase in aircraft CO_2 baseline emissions (average from 2019 and 2020) from its implementation date of 2021. Ireland along with all other EU Member States, opted to participate in CORSIA from the pilot phase which commenced in 2021. An updated review will consider the scope of the current ETS and how it aligns with efforts for a global measure on aviation, in absence of any new amendment the EU ETS will revert to the full scope of flights from, to and within EEA from 2024.

11.6.5 The impacts of these market-based measures have not been incorporated into the GHG calculations presented within this chapter - all calculations are gross emissions prior to these measures reducing or off-setting the total emissions.

11.6.6 From the perspective of the Applicant all aircraft emissions fall under Scope 3[45] for carbon accounting purposes. They are outside the Applicant's direct control, but can be influenced by efficient airside infrastructure design, delivery and services such as Fixed Electrical Ground Power (provided by the Applicant) and how aircraft operate at the airport (influenced by airlines, the Air Navigation Service Provider and the Applicant). One such example is Airport Collaborative Decision Making (A-CDM) which Dublin Airport is implementing. This brings all stakeholders together to improve the efficiency of the

[41] The 'With Additional Measures' scenario is a scenario used by the EPA for the modelling of Ireland's projected National Emissions Inventories.
[42] European Commission, (2022). EU Emissions Trading System (EU ETS). Available at: https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en (Accessed 10/07/2023).
[43] Icao, (2023). Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). Available at: https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx (Accessed 10/07/2023)
[44] Fit for 55 - The EU's plan for a green transition - Consilium (europa.eu)
[45] Scope 3 emissions are defined within the Greenhouse Gas Protocol corporate accounting and reporting standard as indirect GHG emissions that occur as "*a consequence of the activities of the company, but occur from sources not owned or controlled by the company*".

airside operations at the airport. The Applicant is also certified under Level 3 of the Airport Carbon Accreditation scheme.

11.6.7 Within the Carbon Reduction Strategy the Applicant has stated they will "*work closely with our airlines participating in CORSIA to help stabilise their net carbon emissions by developing infrastructure which supports efficient operations of aircraft on the ground and encourages the introduction of new generation, fuel efficient aircraft*."

11.6.8 Additionally, in July 2021, the European Commission adopted a package of proposals to make the EU's climate, energy, land use, transport and taxation policies fit for reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. Within this package is the Alternative Fuels Infrastructure Regulation, which requires that aircraft have access to clean electricity supply in major airports, thereby reducing emissions from Auxiliary Power Unit (APU) usage. Also, the ReFuelEU Aviation Initiative will oblige fuel suppliers to blend increasing levels of sustainable aviation fuels in jet fuel taken on-board at EU airports, including synthetic low carbon fuels, known as e-fuels. This sets targets of SAF blending from 2025 onwards to reduce the fuel emissions, with 2% minimum share by 2025, and 20% by 2035. The CO_2 effects of SAF blending have not currently been considered in the assessment.

11.6.9 Further measures outlined in the Applicant's Carbon Reduction Strategy include better surface transport access to the airport, facilitation of improved transport links to and from the airport, and for all traffic generating applications at the airport to demonstrate measures to maximise non-motorised and public transport use while minimising the use of the private car.

11.6.10 Moreover, current and forthcoming policies on carbon reduction are driving the international aviation industry to research and innovate methods to decarbonise including through technology, operations or fuels. Fuels represents the largest potential to reduce CO_2 emissions e.g., through the adoption of Sustainable Aviation Fuels based on biomass, waste and atmospheric CO_2, or non-drop-in fuels such as hydrogen and electricity. These initiatives have not been incorporated in the GHG calculations but should be highlighted as in progress, and as being key components of the aviation industry's movement towards Net Zero by 2050.

11.7 Assessment of Effects and Significance

Effects During Operation of Proposed Relevant Action

GHG Emissions for the Permitted and Proposed Scenarios

11.7.1 Table 11-3, Table 11-4, Table 11-5 and Table 11-6 present the projected CO_2e emissions associated with the LTO cycle, CCD phase, surface access passenger journeys and total GHG emissions, respectively, for the Permitted and Proposed Scenarios for each of the assessment years. The variation in emissions between the Permitted and Proposed Scenarios represents the additional emissions as a result of the proposed Relevant Action.

Table 11-3: LTO Emissions Projections – Permitted vs Proposed Scenarios

	LTO Emissions (tCO_2e)			
Year	Permitted	Proposed	Variation	% Variation (permitted to proposed)
2025	397,835	414,489	**16,654**	4.19%
2035	427,343	415,120	**-12,222**	-2.86%

Table 11-4: CCD Emissions Projections – Permitted vs Proposed Scenarios

Year	CCD Emissions (tCO_2e)			
	Permitted	**Proposed**	**Variation**	**% Variation (permitted to proposed)**
2025	3,435,638	3,453,891	**18,253**	0.53%
2035	3,916,945	3,469,233	**-447,712**	-11.43%

Table 11-5: Surface Access Passenger Journey Emissions Projections – Permitted vs Proposed Scenarios

Year	Surface Access Passenger Journey Emissions (tCO_2e)			
	Permitted	**Proposed**	**Variation**	**% Variation (permitted to proposed)**
2025	285,671	298,637	**12,966**	4.54%
2035	301,722	303,120	**1,398**	0.46%

Table 11-6:Total Annual GHG Emissions Projections – Permitted vs Proposed Scenarios

Year	Total Annual GHG Emissions (tCO_2e)			
	Permitted	**Proposed**	**Variation**	**% Variation (permitted to proposed)**
2025	4,119,144	4,167,017	**47,873**	1.16%
2035	4,646,010	4,187,473	**-458,537**	-9.87%

Assessment of Significance of Effects

11.7.2 In 2025, under the Proposed Scenario, an increase in flights is expected to lead to an increase in GHG emissions compared to the Permitted Scenario. However, in 2035, a decrease in emissions is expected between the Permitted and Proposed Scenarios. While there are the same number of flights in each scenario, some of the short-haul night flights that have been modelled as part of the Proposed Scenario do not occur under the Permitted Scenario (as per the Mott McDonald Impact of the Operating Restrictions Report which concludes that Permitted Scenario has a disproportionate impact on the base carriers with mostly short haul flights being affected) and are expected to be replaced with long-haul day flights, therefore leading to increased CCD emissions under the Permitted Scenario. This increase in short-haul flights and decrease in long-haul flights under the Proposed Scenario for 2035 (relative to the Permitted Scenario) results in lower CCD emissions associated with these flights.

11.7.3 As described in 11-6, the impact of the proposed Relevant Action has been compared with Ireland's projected National Emissions Inventories for each of the assessment years (under the 'With Additional Measures' scenario) to determine the magnitude of effect (see Table 11-7). The impact of the proposed Relevant Action has been further contextualised by comparing the CO_2e emissions with the projected

Transport Emissions Inventories for each of the assessment years (under the With Additional Measures scenario).

Table 11-7: GHG Emissions Against Future National Emissions Inventory Scenarios using EPA inventory projections

Year	Additional Annual GHG Emissions (kt CO_2e)	Projected National Emissions Inventory (kt CO_2e)	Emissions as a % of National Emissions Inventory	Significance
2025	*47.9*	*55,316*	*0.09%*	Minor Adverse
2035	*-458.5*	*38,397*	*-1.19%*	Beneficial

Table 11-8: GHG Emissions Against Future Transport Emissions Inventory Scenarios

Year	Additional Annual GHG Emissions (kt CO_2e)	Projected National Emissions Inventory (kt CO_2e)	Emissions as a % of National Emissions Inventory
2025	101.8	12,490	0.81%
2035	-57.0	11,000	-0.52%

11.7.4 As aforementioned, the updated IEMA guidance identifies two major considerations when assessing the significance of a project's GHG emissions: the level of mitigation of GHG emissions and the alignment to a trajectory towards net zero by 2050.

GHG Mitigation

11.7.5 Section 11.6 provides detail on how the Applicant is working to reduce GHG emissions where possible, for example by providing efficient airside infrastructure design, delivery and services such as Fixed Electrical Ground Power, and by collaborating with key stakeholders to improve the efficiency of the airside operations at the airport. This is in addition to the aforementioned market-based solutions which aim to incentivise carbon reductions across the aviation sector as well as the Alternative Fuels Infrastructure Regulation and the ReFuelEU Aviation Initiation which will assist in reducing net greenhouse gas emissions.

11.7.6 Whilst these mitigation measures have not been factored into the GHG calculations, they are expected to result in a reduction in additional ATM emissions modelled as a result of the proposed Relevant Action.

Net zero trajectory

11.7.7 The IEMA guidance states, "*The assessment should seek to quantify the difference in GHG emissions between the proposed project and the baseline scenario*" and that "*Assessment results should reflect the difference in whole life net GHG emissions between the two options*". Therefore, it is not the GHG emissions from the airport as a whole being assessed here, but rather the variation in emissions between Permitted and Proposed (as presented in Table 11-6), which is considered to represent the 'GHG impact' of the proposed Relevant Action.

11.7.8 As the GHG impact of the proposed Relevant Action decreases over time compared to the permitted scenario, eventually resulting in a net benefit in by 2035, the proposed Relevant action is considered to be in line with the Ireland's trajectory towards net zero as shown in Figure 11-2. Note that the Figure uses two very different scales for Ireland's projected carbon trajectory and the trajectory of the proposed Relevant Action. Figure 11-2 has been produced primarily to compare the two trajectories, and not the magnitudes.

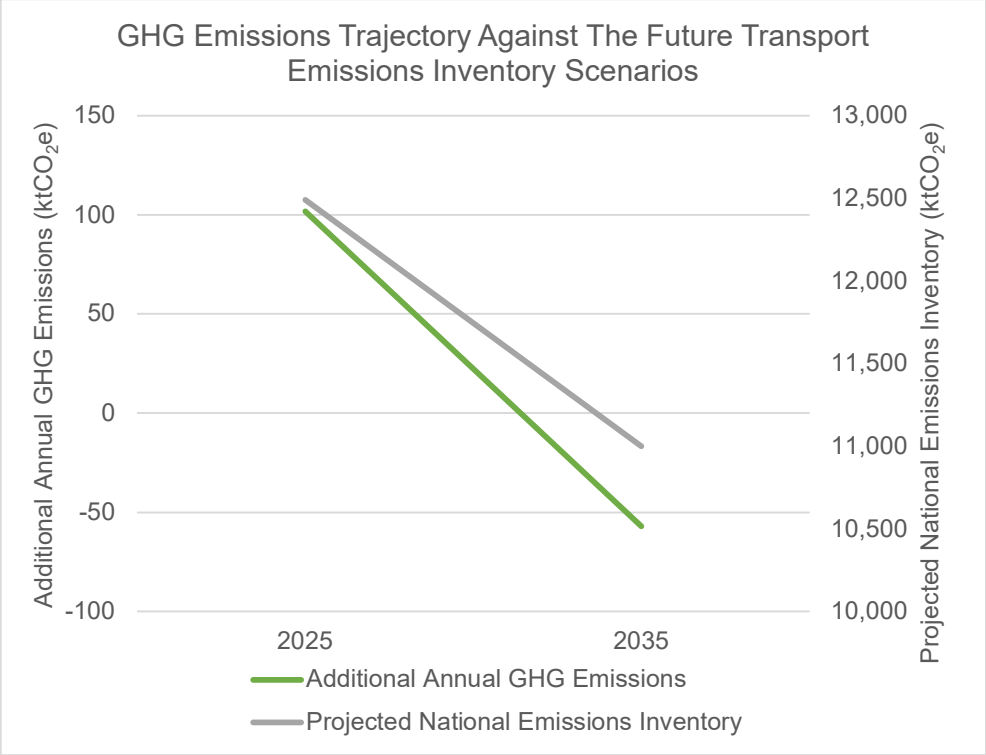

Figure 11-2 The impact of the proposed Relevant Action has been compared with Ireland's projected National Emissions Inventories for each of the assessment years

11.7.9 In 2035, there is a 9.87% reduction in emissions for the projected transport emissions inventory for Ireland (With Additional Measures).

11.7.10 As good practice carbon reduction measures are in place, and as the trajectory between 2025 and 2035 for the proposed Relevant Action is in line with the trajectory of the projected transport emissions inventory for Ireland (With Additional Measures), the impact of the proposed Relevant action for the 2025 assessment year is considered to be minor adverse (not significant).

11.7.11 Despite resulting in a net GHG emissions reduction in 2035, the proposed Relevant Action is not considered to be 'beneficial' or 'negligible' as it has not gone well beyond existing policy and is not well ahead of the curve towards net zero. For these reasons the proposed Relevant Action is considered to have a minor adverse, not significant impact.

11.8 Mitigation and Monitoring

11.8.1 No additional mitigation and monitoring is proposed to offset the identified effects of the proposed Relevant Action. As described in Section 11.6, above, measures to offset GHG emissions and monitoring of those measures, is proposed on an airport-wide basis and set out in the Applicant's Carbon Reduction Strategy.

11.9 Residual Effects and Conclusions

11.9.1 This section identifies the residual effects, which following the implementation of mitigation and monitoring measures, cannot be eliminated through design changes or the application of standard mitigation measures.

11.9.2 There will be unavoidable GHG emissions resulting from the operational phase of the proposed Relevant Action. However, as the effects are considered to be minor adverse and therefore not significant, it is not appropriate to define any mitigation measures further to the ones detailed in Section 11-14.

Table 11-9: Climate Change Summary of Potential Effects

Description of Effect	Sensitivity of Receptor	Nature of Effect / Geographic Scale	Magnitude of Impact	Initial Classification of Effect (with embedded mitigation)	Additional Mitigation	Residual Effect Significance
Operational Phase						
GHG emissions	High	Long-term/ Global	Low	Minor	None	Minor (not significant)

Likely Significant Environmental Effects

11.9.3 The magnitude of effect of the GHG emissions impact of the proposed Relevant Action considering the receptor's sensitivity (global climate) will be minor adverse. IEMA guidance specifies that minor adverse means that the project has complied with existing and emerging policy requirements and is fully in line to achieve Ireland's trajectory towards net zero and therefore **not significant**.

What has changed since the EIAR was submitted in September 2021?

The chapter has been revised to take account of:

- The latest air traffic forecasts
- Updated guidance presented in IEMA's 'Guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance'
- The Climate Action and Low Carbon Development (Amendment) Act 2021
- Climate Action Plan 2023