SDCC Rathcoole Housing Development

Environmental Impact Assessment Report (EIAR)
Chapter 10: Climate

South Dublin County Council (SDCC)

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10 Climate

10.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) identifies, describes and assesses the likely significant effects of the Proposed Development on climate as well as the potential effects of climate change on the Proposed Development.

In line with European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) (European Union, 2018) and the Institute of Sustainability and Environmental Professionals (ISEP) (formerly known as the Institute of Environmental Management and Assessment (IEMA)) Guidance on Assessing Greenhouse Gas Emissions (ISEP, 2022), ISEP Supplementary GHG Assessment Guidance (ISEP, 2026) and Climate Change Resilience and Adaptation (ISEP, 2020), consideration is given to the following aspects of climate change assessment:

- Lifecycle Greenhouse Gas (GHG) Assessment: an assessment of the GHG emissions arising over the life of the Proposed Development and the potential impacts on the climate;
- Climate Change Risk Assessment (CCRA): an assessment of the vulnerability and risk of the Proposed Development to the projected impacts of climate change; and
- In-combination Climate Change Impact (ICCI) Assessment: an assessment of the resilience of receptors in the surrounding environment to the combined impact of future climate conditions and the Proposed Development.

The GHG Assessment is an estimation of GHG emissions resulting from the construction and operation of the Proposed Development.

The CCRA considers the vulnerability of the Proposed Development to potential impacts resulting from climate change. The ICCI assessment considers the combined impact of climate change and the Proposed Development on other surrounding environmental receptors, as identified by the relevant technical disciplines reported within this EIAR. The CCRA and ICCI assessments assess the climate change impacts during the construction and operational phases of the Proposed Development.

Decommissioning has been scoped out of the GHG assessment, CCRA and the ICCI Assessment, as the Proposed Development is expected to remain occupied and in-use after the end of the stated design life, consistent with the wider EIAR.

10.2 Legislation, Policy and Guidance

This section summarises the legislation, policy and guidance which have informed the scope and methodology used for assessments reported in this chapter. More general sources of guidance applicable to the Environmental Impact Assessment (EIA) methodology can be found in Chapter 01: Introduction & Methodology.

In line with the relevant legislation, policy and guidance, the GHG Assessment evaluates the GHG impact of the Proposed Development in the context of Ireland's carbon budgets to provide context and scale in relation to Ireland's trajectory towards net zero. The resilience of the Proposed Development to projected climate change impacts is also reviewed in the CCRA.

10.2.1 International Agreements and Relevant Legislation

Kyoto Protocol

The Kyoto Protocol (UNFCCC, 1997) enforces the UN Framework Convention on Climate Change by requiring industrialised countries and transition economies to meet specific GHG emission reduction targets. It mandates that only developed nations are legally bound to reduce emissions, reflecting the principle of ‘common but differentiated responsibility’, which holds these countries more accountable due to their historical contributions to high atmospheric GHG levels. Annex B of the Protocol outlines binding reduction targets for 37 industrialised nations and the EU.

Paris Agreement

The Paris Agreement (UNFCCC, 2015) is a legally binding international treaty within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with GHG emissions mitigation, adaptation and finance starting in the year 2020. It requires all signatories to declare their Nationally Determined Contributions (NDC) towards balancing anthropogenic sources and sinks of GHGs in the second half of this century with the objective of keeping global warming to well below 2°C and to pursue efforts to limit global warming to 1.5°C.

European Climate Law

The European Climate Law (European Commission, 2021a) writes into law the goal set out in the European Green Deal for Europe's economy and society to become climate-neutral by 2050. The law also sets the intermediate target of reducing net GHG emissions by at least 55% by 2030, compared to 1990 levels.

The European Green Deal

The European Green Deal (European Commission, 2019) is a package of policy initiatives which aims to set the EU on the path to a green transition, with the ultimate goal of reaching climate neutrality by 2050. It supports the transformation of the EU into a fair and prosperous society with a modern and competitive economy.

European Union (EU) Adaptation Strategy

The European Commission adopted its new EU strategy on adaptation to climate change (European Commission, 2021b) on 24 February 2021. The new strategy sets out how the European Union can adapt to the impacts of climate change and become climate resilient by 2050. The Strategy has four principal objectives: to make adaptation smarter, swifter and more systemic, and to step up international action on adaptation to climate change.

EU Fit for 55

On July 14, 2021, the European Commission adopted a package of legislative proposals ‘Fit for 55’ (European Commission, 2021c) as part of the European Green Deal, which aims to strengthen the EU's position as a global climate leader. The package aims to modernise existing legislation in line with the EU's 2030 climate target and introduce new policy measures to help bring about the transformative changes needed in the economy, society and industry to achieve climate neutrality by 2050 and to support it, reduce net emissions by at least 55% (compared to 1990) by 2030.

Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast)

The EU Directive on the Energy Performance Of Buildings (European Parliament, 2024) adopted in May 2024, enhances the energy performance requirements for new buildings. It requires all new residential and non-residential buildings to be zero-emission buildings as of 1 January 2028 for buildings owned by public bodies and 1 January 2030 for all other new buildings, with the possibility for specific exemptions. In the revised directive, a zero-emission building has no on-site carbon emissions from fossil fuels and a very high energy performance. The new rules will therefore align the energy performance of buildings with the EU’s climate neutrality goal for 2050 and the energy efficiency first principle.

Climate Action and Low Carbon Development (Amendment) Act 2021

The Climate Action and Low Carbon Development (Amendment) Act 2021 (Government of Ireland, 2021) supports Ireland’s transition to net zero and achieving its goal of a climate neutral economy by no later than 2050. It established a legally binding framework with clear targets and commitments set into law, and results in the necessary structures and processes being embedded on a statutory basis for Ireland to achieve its national, EU and international climate goals and obligations in the near and long term. Section 15 of this Act describes how GHG emissions should be reported in relation to Ireland’s national carbon budgets.

10.2.2National Policy

Ireland’s Climate Action Plan 2025

The Climate Action Plan (CAP) 2025 is the third annual update to Ireland’s Climate Action Plan 2019. This plan is the second to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021. It builds on the introduction of carbon budgets and sectoral emissions ceilings in Climate Action Plan 2024 and sets a course for Ireland’s targets to halve emissions by 2030 and reach net-zero no later than 2050. These national targets align with the legally binding economy-wide carbon budgets and sectoral

emissions ceilings that were agreed by Government in July 2022 alongside Ireland's obligations under EU and international treaties, most notably the Paris Agreement (2015) and the European Green Deal (2020).

10.2.3Local Policy

South Dublin County Council (SDCC) Climate Action Plan 2024-2029

The SDCC Climate Action Plan 2024-2029 was approved on 12 February 2024 and published on 7 March 2024. It sets out mitigation, adaptation and other climate action measures under the Climate Action and Low Carbon Development (Amendment) Act 2021, supporting the National Climate Objective of a climate-neutral economy by 2050. The Plan centres on four targets: 50% improvement in the Council's energy efficiency by 2030; 51% reduction in the Council's GHG emissions by 2030; to make Dublin a climate resilient region, by reducing the impacts of future climate change-related events; and to actively engage and inform our communities on climate action.

10.2.4Guidance

UK DEFRA & DESNZ Guidance

The UK Department for Environment, Food and Rural Affairs (DEFRA) and the UK Department for Energy Security and Net Zero (DESNZ) Greenhouse Gas Reporting: Conversion Factors 2025 (DESNZ, 2025) provides a comprehensive set of factors for converting various activities and emissions into equivalent GHG emissions. These conversion factors allow organizations 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, energy use and waste disposal methods, enabling businesses and policymakers to assess their environmental impact and develop effective strategies for reducing GHG emissions.

This UK guidance has been used where relevant national-specific GHG emission factor data are not available for Ireland. Furthermore, The DEFRA/DESNZ Conversion Factors are appropriate to use in Ireland in the absence of Irish-specific emission factors as they provide a standardized and widely accepted framework for calculating and reporting GHG emissions, ensuring consistency and comparability across different sectors and allowing for a meaningful assessment of environmental impact.

EU Commission Notice (2021/C 373/01)

The EU Commission Guidance (2021/C 373/01) (European Commission, 2021d) provides technical guidance on the climate proofing of infrastructure covering the period 2021-2027. 'Climate proofing' is defined within the guidance notice as "*a process that integrates climate change mitigation and adaptation measures into the development of infrastructure projects*". Climate change mitigation (i.e. GHG emissions reduction) and adaptation (i.e. adapting to projected changes in climate) form the two pillars of climate proofing described within the guidance notice.

Publicly Available Standard (PAS) 2080:2023 Carbon Management in Buildings and Infrastructure

PAS 2080:2023 (BSI, 2023) provides guidance on how to manage carbon emissions and promote sustainability in infrastructure projects. The standard outlines a framework for the management of GHG emissions throughout the project lifecycle, from planning and design to construction and operation.

University of Bath Inventory of Carbon and Energy

The University of Bath's Inventory of Carbon and Energy (ICE) database (ICE, 2025), developed in collaboration with Circular Ecology, provides a comprehensive resource on the environmental impacts of producing, using, and disposing of various goods and services, particularly construction materials. The ICE database, which focuses on the cradle-to-gate lifecycle stages (A1-A3), offers average carbon factors derived from thousands of data points. It allows users to obtain embodied carbon values for major building materials, including lower-carbon alternatives like Pulverised Fuel Ash (PFA) and Ground Granulated Blast Furnace Slag (GGBS) mixtures.

Royal Institution of Chartered Surveyors (RICS) Professional Standard: Whole Life Carbon Assessment for the Built Environment (2nd edition, 2023)

The RICS WLCA Standard (RICS, 2023) provides a consistent life cycle GHG assessment implementation plan and reporting structure for built projects, in accordance with BS EN 15978: 2011 Sustainability of construction works Assessment of environmental performance of buildings Calculation method.

ISEP Guide: Assessing Greenhouse Gas Emissions and Evaluating their Significance

The ISEP guidance (ISEP, 2022 and 2026 Edition) provides a methodology for GHG emissions assessment, mitigation and reporting within statutory and non-statutory EIA, including the establishment of baseline emissions and the evaluation of their significance.

ISEP EIA Guide to: Climate Change Resilience and Adaptation

This ISEP guidance (ISEP, 2020) provides a framework for assessing climate change resilience and adaptation within EIA, covering the identification of climate risks and vulnerabilities and the evaluation of their significance.

10.3 Methodology

10.3.1 Lifecycle GHG Impact Assessment

This section presents the methodology used to quantify the GHG emissions resulting from the construction and operation of the Proposed Development, and the method for determining the significance of these GHG emissions. The methodology presented is in accordance with best practice for GHG accounting.

10.3.1.1 Assessment Methodology

To identify the magnitude of GHG impact over the lifecycle of the Proposed Development, GHG emissions have been calculated in line with the PAS 2080:2023 Guidance (BSI, 2023) and ISEP guidance (ISEP, 2020) (ISEP, 2022). GHG emissions from construction activities, embodied carbon in materials, and the operation of the Proposed Development have been quantified using a calculation-based methodology:

Activity data x GHG emissions factor = GHG emissions value

Activity data is a quantifiable measure of activity, such as operating hours or volumes of fuels used. Emission factors convert the activity data into GHG emissions. Specific activity data for the Proposed Development are not currently available. Where specific data was not available, a mix of assumptions and industry benchmarks have been used to fill data gaps. Where this was not possible, then a qualitative approach to assessing the GHG impacts was followed, in line with the ISEP GHG Guidance (ISEP, 2022).

To calculate the lifecycle GHG emissions impact of the Proposed Development, GHG emissions have been reported in tonnes of carbon dioxide equivalent (tCO_2e). Where appropriate GHG emissions factors allow, the following seven Kyoto Protocol GHGs have been collectively accounted for under tCO_2e in line with the GHG Protocol:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);
- Sulphur hexafluoride (SF_6);
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Nitrogen Trifluoride (NF_3).

Estimates of material quantities required for the construction of the Proposed Development were not available at the time of writing this assessment. In their absence, benchmarked carbon intensity factors published by the Future Homes Hub (FHH, 2025) have been utilised to estimate emissions for the residential areas of the Proposed Development on a 'per m^2' basis during construction and operation.

Additionally, the calculation-based methodology described above was used to account for any additional emissions resulting from the construction of non-residential assets, including infrastructure related to the new roads and the substation.

For operational GHG emissions sources, benchmarked carbon intensity factors from Future Homes Hub (FHH, 2025) have also been utilised for operational energy calculations. DEFRA/DESNZ emissions factors (DESNZ, 2025) have been utilised for the estimation of user utilisation emissions (B8).

Table 10-1 summarises the key anticipated GHG emissions sources associated to the Proposed Development by lifecycle stage, in line with PAS 2080:2023 (BSI, 2023).

Table 10-1: Potential GHG Emissions Arising from the Proposed Development

Life Cycle Stage	PAS 2080:2023 Module	Scoped In/ Out	Activity	Primary Emission Sources
Product stage	A1-3	In	Raw material extraction and manufacturing of products are required to build the equipment for the Proposed Development.	Embodied GHG emissions from energy use in the extraction of materials and manufacture of components and equipment.
			Transportation of materials for such processes/manufacturing (where available).	GHG emissions from the transportation of products and materials during their processing and manufacture. Due to the nature of the equipment, this could require shipment of certain aspects over significant distances.
Construction process stage	A4	In	Transportation of construction materials to the Proposed Development. Due to the nature of equipment required, this could require shipment of certain aspects over significant distances.	Transport of construction materials is included under the construction process stage, where these are not included in embodied GHG emissions. Fuel consumption from transport of materials to site (where these are not included in embodied GHG emissions).
	A5	In	On-site construction activity.	GHG emissions arising from energy (electricity, fuel, etc.) consumption for plant and vehicles, and generators on site.
			Transport of construction workers.	GHG emissions from fuel use for worker commuting.
			Disposal of any waste generated during the construction processes.	GHG emissions from disposal of waste.
			Land Clearance/Enabling Works.	GHG emissions associated with land disturbance.
Operation stage	B1-8	In	Operation of the Proposed Development.	GHG emissions from energy and gas consumption, water use and the treatment of wastewater.
			Maintenance of the Proposed Development.	GHG emissions arising from energy consumption, material use and waste generation from the Proposed Development's maintenance.
			User emissions.	GHG emissions arising from resident commuting and travel.
Decommissioning stage	C1-4	Out	On-site decommissioning activity.	Energy (electricity, fuel) consumption from plant, vehicles, and generators. Disposal of waste material

10.3.1.2 Study Area

The study area for the Lifecycle GHG Assessment includes:

- Direct GHG emissions arising through the construction and operation works within the Site as described in Chapter 02: Description of Development;

- Indirect GHG emissions occurring off-site, encompassing embodied carbon in materials, transportation, upstream activities (such as well-to-tank processes), as well as the processing and disposal of waste.

10.3.1.3 Significance Criteria

The ISEP (2022) Guidance and the supplementary guidance (ISEP, 2026) is considered best practice and has been used in the assessment. This 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 Development has therefore been factored into the assessment criteria. Table 10-2 states the significance criteria that have be applied to the Lifecycle GHG Assessment for the Proposed Development.

Table 10-2: GHG Emissions Significance Criteria

Significance Level	Effects	Description	Example in the Guidance
Significant	Major Adverse	A project that follows a 'business-as-usual' or 'do minimum' approach and is not compatible with Ireland's net zero trajectory or accepted aligned practice or area-based transition targets. It is down to the practitioner to differentiate between the 'level' of significant adverse effects e.g. 'moderate' or 'major' adverse effects.	The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to Ireland's trajectory towards net zero.
	Moderate Adverse		The project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to Ireland's trajectory towards net zero.
Not Significant	Minor Adverse	A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that.	The project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve Ireland's trajectory towards net zero.
	Negligible	A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory and has minimal residual emissions. This project is playing a part in achieving the rate of transition required by nationally set policy commitments.	The project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.
Significant	Beneficial	A project that causes GHG emissions to be avoided or removed from the atmosphere. Only projects that actively reverse (rather than only reduce) the risk of severe climate change can be judged as having a beneficial effect.	The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

A project's impact can shift from significant adverse to non-significant effects by incorporating mitigation measures that substantially improve on business-as-usual and meet or exceed the science-based emissions trajectory of ongoing but declining emissions towards net zero.

10.3.1.4 Determining the Magnitude of Impact

The GHG impact of the Proposed Development during construction has been compared against Ireland's Carbon Budgets (Government of Ireland, 2022a) in Table 10-3. The GHG emissions have also been compared against Ireland's Industry Sectoral Emission Ceilings (Government of Ireland, 2022b) found in Table 10-4. Ireland's Built Environment - Residential Sectoral Emission Ceiling sets out the 2030 net zero trajectory for construction emissions related to residential infrastructure under the Climate Action and Low Carbon Development Amendment Act 2021 (Government of Ireland, 2021). This budget has been used as a proxy to contextualise the Proposed Development's construction emissions in order to determine the significance of emissions in line with Table 10-2.

Table 10-3: Ireland's Carbon Budgets Relevant to the Construction Period

Carbon Budget	Ireland Carbon Budget ($MtCO_2eq$)
Carbon Budget 2 (2026 – 2030)	200

Table 10-4: Ireland's Industry Sectoral Emission Ceiling

Carbon Budget	Ireland's Built Environment - Residential Sectoral Emission Ceiling ($MtCO_2eq$)
Carbon Budget 2 (2026 – 2030)	27.45

Operational emissions have also been compared against Ireland's Carbon Budget's (Government of Ireland, 2022a) for the operational period as per Table 10-5. The operational emissions have also been compared against Ireland Transport's Trajectory outlined in Table 10-19. The 'With Additional Measures' scenario assumes the implementation of extra mitigation policies, leading to a faster rate of decarbonisation.

Table 10-5: Ireland's Carbon Budgets Relevant to the Operational Period

Carbon Budget	Ireland Carbon Budget ($MtCO_2eq$)
Carbon Budget 2 (2026 – 2030)	200
Carbon Budget 3 (2031 – 2035)	151

10.3.1.5 Sensitive Receptors

The global climate is identified as the receptor for the GHG emissions assessment and the sensitivity of the climate to GHG emissions is considered to be 'high'. However, for the purposes of this assessment, the Irish carbon budgets are used here as a proxy for the global climate.

The rationale for this approach is in alignment with the Paris Agreement (UNFCCC, 2015), which sets to strengthen the global response to the threat of climate change by keeping global temperature rise this century well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5°C. Additionally, a recent report by the Intergovernmental Panel on Climate Change (IPCC) highlighted the importance of limiting global warming below 1.5°C (IPCC, 2018).

To support the Paris Agreement's climate targets, it requires countries to substantially reduce GHG emissions which support a trajectory that leads to net-zero emissions this century. This commitment is formalised through Nationally Determined Contributions (NDCs), where committed countries outline their specific emission reduction targets. Hence, Ireland's National Emissions Trajectory has been used as a proxy for the global climate to contextualise GHG emissions from the Proposed Development.

10.3.2 Climate Change Risk Assessment

The methodology for the CCRA has been developed in line with appropriate industry guidance for assessing climate change resilience and adaptation, including ISEP's 'Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation' guidance (ISEP, 2020), and in accordance with the EU

Commission Notice (2021/C 373/01) 'Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027' (European Commission, 2021d).

Historic climate data was obtained from Met Éireann for Casement, using a 1981-2010 baseline. Following obtaining historic data, future climate projections were obtained for two emissions scenarios, Representative Concentration Pathway (RCP) 4.5 and RCP 8.5 from Climate Ireland. The 2021-2050 future timeframe was used to gather future climate projection data for the Proposed Development construction phase. 2021-2050, 2041-2070 and 2071-2100 future timeframes were used to gather future climate projection data for the Proposed Development operational phase. This is because the operational phase runs from 2030 to 2090 therefore is covered by the three future timeframes, whereas Proposed Development construction runs from 2027 to 2029, thus falling into the 2021-2050 future timeframe only.

Following desk-based research to obtain qualitative and quantitative baseline climate data and future climate change projections data, a risk assessment was undertaken to identify potential physical climate risks that could pose a threat to the Proposed Development, during construction and operation.

The CCRA includes all infrastructure and assets associated with the Proposed Development during its construction and operational phase, as well as human receptors. As per the Task Force on Climate-related Financial Disclosures (TCFD) guidelines, this assessment looks at the resilience against both gradual climate change, i.e. chronic climate-related hazards, and the risks associated with an increased frequency of severe weather events, i.e. acute events.

The following key terms and definitions relating to the assessment have been used, in line with the IPCC Sixth Assessment Report on Climate Change 2022: Impacts, Adaptation and Vulnerability (IPCC, 2022):

- Climate Hazard: possible, future occurrence of natural or human-induced physical events that may have an adverse effect on vulnerable and exposed elements, for example increased summer temperatures;
- Climate Risk: the interaction between hazard, exposure and vulnerability, which has potential to do harm to environmental or community receptors or assets, for example increased summer temperatures can cause heat stress for workers; and
- Climate Impact/Consequence: the consequences of realised risks on natural and human systems, where risks result from the interactions of climate-related hazards, exposure and vulnerability.

The risk framework used for the assessment and the descriptors of likelihood and consequence were derived from the EU Technical Guidance on Climate Proofing (European Commission, 2021d). The likelihood analysis, consequences analysis and risk matrix are provided in Table 10-6, Table 10-7 and respectively. Only risks rated 'high' or 'extreme' were classed as being significant and risks rated 'low' and 'medium' were classed as not significant in this CCRA.

Following the identification of a climate risk and taking any identified planned controls (i.e. embedded mitigation) into account, the climate risk has been rated based on the likelihood of it occurring, using likelihood analysis outlined in Table 10-6, followed by the consequence level based on Table 10-7.

Table 10-6: Level of Likelihood of Climate Risk

Level of likelihood of climate impact occurring	Definition of likelihood	Quantitative
Almost certain	Likelihood of climate hazard occurring is high and impact is always/almost always going to occur.	95% probability that the impact will occur.
Likely	Likelihood of climate hazard occurring is high and impact is always/almost always going to occur.	80% probability that the impact will occur.
Moderate	Likelihood of climate hazard occurring is high and impact occurs often or the likelihood of climate hazard occurring is moderate and impact is likely to occur always/almost always.	50% probability that the impact will occur.

Level of likelihood of climate impact occurring	Definition of likelihood	Quantitative
Unlikely	Likelihood of climate hazard occurring is high, but impact rarely occurs or the likelihood of climate hazard occurring is moderate and impact sometimes occurs or the likelihood of climate hazard occurring is low and impact is likely to occur always/almost always.	20% probability that the impact will occur.
Rare	All other eventualities – highly unlikely but theoretically possible.	5% probability that the impact will occur.

Source: European Commission (2021d)

Table 10-7: Level of Consequence of Climate Impact

Consequence of Impact	Description
Catastrophic	Disaster with the potential to lead to shut down or collapse or loss of the asset/network; Single or multiple fatalities; Significant environmental harm with widespread effect and recovery longer than one year; Loss of social licence to operate; and/or Permanent financial impact.
Major	Permanent damage to structures/assets; Complete loss of operation/service; Complete/partial renewal of infrastructure; Exceptional environmental damage; and/or Extreme financial impact.
Moderate	Partial infrastructure damage and some loss of service; Some infrastructure renewal; Adverse impact on the environment; and/or Moderate financial impact.
Minor	Localised infrastructure disruption and minor loss of service; No permanent damage, minor restoration work required; Slight adverse environmental effects; and/or Small financial losses.
Insignificant	No damage to infrastructure; No impacts on the environment; No adverse financial impact.

Source: European Commission (2021d)

The effect significance for the CCRA has been determined as a function of the likelihood of a Climate Risk occurring and the Climate Impact/Consequence using the significance matrix as shown in Table 10-8 which is in accordance with the EU Commission Notice (2021/C 373/01) (European Commission, 2021d) and in line with the ISEP guidance for conducting CCRAs (ISEP, 2020). Where a risk is determined as High or Extreme, this has been deemed to be Significant. Medium and Low risks are classified as Not Significant. The assessment considers confirmed design and mitigation measures (referred to as embedded mitigation).

Table 10-8: Significance Matrix

		Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Rare	Low (NS)	Low (NS)	Medium (NS)	High (S)	Extreme (S)
	Unlikely	Low (NS)	Low (NS)	Medium (NS)	High (S)	Extreme (S)
	Moderate	Low (NS)	Medium (NS)	High (S)	Extreme (S)	Extreme (S)
	Likely	Medium (NS)	High (S)	High (S)	Extreme (S)	Extreme (S)
	Almost certain	High (S)	High (S)	Extreme (S)	Extreme (S)	Extreme (S)

Source: European Commission (2021d)
S = Significant, NS = Not Significant

10.3.3 In-Combination Climate Change Impact Assessment

The purpose of the ICCI Assessment is to identify any impacts on receptors in the surrounding environment and communities that occurs due to the combined impacts of climate change and the construction and operation of the Proposed Development.

The assessment considers the existing and projected future climate conditions for the geographical location and assessment timeframe. It also identifies the extent to which identified receptors in the surrounding environment are potentially vulnerable to and affected by these factors.

The methodology for the ICCI assessment follows the methodology as the CCRA, but focuses on different receptors as identified by other discipline chapters as reported within this EIAR.

The receptors for the ICCI are receptors within the surrounding environment that will be impacted by the Proposed Development in combination with future climatic conditions. Baseline conditions for the ICCI assessment have been determined using the climate change projections data from Met Éireann.

Once potential ICCIs have been identified in relation to the Proposed Development, the likelihood of climate impacts occurring during construction and operation phases have been categorised using the likelihood analysis outlined in Table 10-9. This includes consideration of any embedded mitigation measures and good practice. Following this, the ICCI consequence level has been assessed based on the consequence analysis outlined in Table 10-10.

Table 10-9: Level of Likelihood of an ICCI Occurring

Likelihood Category	Description
Very likely	90-100% probability that the impact will occur during the life of the project
Likely	66-90% probability that the impact will occur during the life of the project
Possible	33-66% probability that the impact will occur during the life of the project
Unlikely	10-33% probability that the impact will occur during the life of the project
Very Unlikely	0-10% probability that the impact will occur during the life of the project

Table 10-10: Level of Consequence for the ICCI Assessment

Consequence of Impact	Description
High	The climate change parameter in-combination with the effect of the Proposed Development causes the significance of the impact of the Proposed Development on the resource/receptor, as defined by the topic, to increase from moderate to major.
Medium	The climate change parameter in-combination with the effect of the Proposed Development causes the significance of the impact of the Proposed Development on the resource/receptor, as defined by the topic, to increase from low to moderate.
Low	The climate change parameter in-combination with the effect of the Proposed Development causes the significance of the impact of the Proposed Development on the resource/receptor, as defined by the topic, to increase from negligible to low.
Very Low	The climate change parameter in-combination with the effect of the Proposed Development does not impact the significance of the impact of the Proposed Development on the resource/receptor, as defined by the topic.

The significance of potential effects has been determined using the matrix in Table 10-11. Where an effect has been identified as Moderate or Major, these are classed as a Significant ICCI effect. If likely significant ICCI effects are evaluated, then appropriate additional mitigation measures (secondary mitigation) are identified.

Table 10-11: Significance Matrix for the ICCI Assessment

		Likelihood of Climate-Related Impact Occurring				
		Very Unlikely	Unlikely	Possible	Likely	Very Likely
Measure of Consequence	Very Low	Negligible (NS)	Negligible (NS)	Negligible (NS)	Negligible (NS)	Negligible (NS)
	Low	Negligible (NS)	Minor (NS)	Minor (NS)	Minor (NS)	Minor (NS)
	Medium	Negligible (NS)	Minor (NS)	Moderate (S)	Moderate (S)	Moderate (S)
	High	Negligible (NS)	Minor (NS)	Moderate (S)	Major (S)	Major (S)

S = Significant, NS = Not Significant

10.3.4 Assumptions & Limitations

10.3.4.1 Lifecycle GHG Assessment

The assumptions for the GHG Assessment are aligned with industry best practices, incorporating the GHG Protocol accounting methodology to consider upstream and downstream emissions. Where applicable, assumptions were based on EU and Irish policies. In the absence of such policies, industry references have been utilised to justify specific assumptions.

Where detailed information is not available regarding types and quantities of materials used, energy use or the embodied carbon of key features of the assets, precautionary assumptions have been made based on industry approximations and professional good practice.

The GHG emissions resulting from the construction and operation of the residential buildings within the Proposed Development have been determined using industry benchmarks (FHH, 2025) due to the unavailability of material quantities at the time of writing the assessment.

Additional assumptions relevant to the assessment of GHG emissions include:

- The construction period is expected to span approximately two years, from June 2027 to May 2029. On-site construction is expected to begin in January 2028 and to complete in May 2029, with handover expected to be completed in 2030;
- The nominal design life over which operational emissions are assessed is 60 years;
- It is estimated that 1,299 m of new roads will be required to be constructed for the Proposed Development. It is assumed all roads will be 6 m wide and be constructed in line with the SDCC Taking in Charge (TIC) Policy Appendix 6 – Roads Minimum Standards, IS EN 13108 and SR28;
- All emissions relating to the construction installation process (including worker travel) and land use change for residential buildings are accounted for within the benchmark factors;
- Maintenance plans for residential buildings are aligned with the carbon intensity of utilised benchmarks;
- Maintenance and repair emissions associated with the new roads have been calculated using standard RICS (2023) assumptions. Replacement emissions assume one road resurfacing during the stated operational period of the Proposed Development;
- Energy demand and emissions projections are based on UK data in the absence of Ireland specific information;
- Operational energy emissions for the substation are not considered within this assessment as they are not expected to materially contribute to the carbon footprint of the Proposed Development. Operational energy emissions related to the Proposed Development are considered to be captured by the energy demand of the residential component;
- User utilisation emissions (B8) have been estimated based on the assumption that 70% of the 386 residents will commute daily to Dublin, with an average return journey of 20 km. There is assumed to be an even split between light rail, bus and personal car modes of transport; and

- Emissions relating to the decommissioning phase have not been considered as the Proposed Development is expected to continue operation beyond its stated design life.

10.3.4.2 Climate Change Risk Assessment

The methodology for the CCRA has been developed in line with appropriate industry guidance for assessing climate change resilience and adaptation, including ISEP (2020) and in accordance with the EU Commission Notice (2021/C 373/01) Technical Guidance (European Commission, 2021d). Following desk-based research to obtain qualitative and quantitative baseline climate data and future climate change projections data, a risk assessment has been undertaken to identify potential physical climate risks that could pose a threat to the Proposed Development during its construction and operation.

The CCRA includes all infrastructure and assets associated with the Proposed Development during its construction and operational phase, as well as human receptors. This assessment looks at the resilience against both gradual climate change, i.e. chronic climate-related hazards, and the risks associated with an increased frequency of severe weather events, i.e. acute events.

In order to understand how the global climate may change in the future, the IPCC's fifth Assessment Report (AR5) (IPCC, 2014) developed Representative Concentration Pathways (RCPs) that describe four different 21st Century pathways of GHG emissions depending on the level of mitigation action undertaken between now and the end of the century. The RCPs are based on global research and existing literature and comprise a stringent mitigation pathway (RCP2.6), two intermediate scenarios (RCP4.5 and RCP6.0) and a high emissions scenario (RCP8.5).

It is important to understand when using climate change projections, that they contain inherent uncertainty. This uncertainty is the result of limitations of available measurements and challenges in evaluating causation in complex and multi-component processes. Uncertainty in climate change projections is derived from multiple sources including:

- Uncertainty in how GHG emissions will change over time due to key unknowns in the drivers of this change; such drivers include economic and population growth, lifestyle and behavioural changes, associated changes in energy use and land use, technology, and climate policy; and
- Variable confidence levels in how well the climate models predict different climate variables; for example, climate models perform less well in their simulation of large-scale precipitation patterns than for surface temperature.

For these reasons, it is best practice to use a range of projection scenarios when considering how the climate may change in the future. As a result, two RCP scenarios were used in this CCRA as they will provide decision-makers with a more holistic understanding of the range of potential climate futures possible, which is essential when understanding risk and developing appropriate adaptation measures.

10.4 Baseline Environment

10.4.1 Lifecycle GHG Assessment

For the purposes of the Lifecycle GHG Assessment, the baseline represents a business-as-usual scenario in which the Proposed Development does not proceed.

For a conservative and transparent comparison, the baseline is treated as a ‘zero-emissions’ scenario, meaning all emissions from the Proposed Development are considered additional. This approach provides a worst-case benchmark against which the net GHG impacts of the Proposed Development can be assessed.

10.4.2 Climate Change Risk Assessment

This section outlines the historic climate baseline data used for undertaking the CCRA. The subsequent section outlines the climate projection data gathered, the justification for the chosen future time period and the RCP scenarios used in this CCRA.

For the purposes of this CCRA, the baseline conditions were based upon historic qualitative and quantitative climate data obtained from Met Éireann. The quantitative data used was sourced from Met

Éireann's Casement Weather Station due to it being located within 8 km of the Proposed Development, as well as its data availability for the required climate variables and baseline period of 1981-2010.

Past Extreme Weather Events

The following past extreme weather events of relevance to Proposed Development have been identified:

- Wettest year on record: Ireland recorded its wettest year on record (since 1941) in 2023, with 1510.9 mm of rainfall for the year (Met Éireann, 2024);
- Storm Betty: Dublin Airport recorded its highest gust for August since 1988, with 47 knots (87 km/h) being recorded early on Saturday 19 August 2023 (Met Éireann);
- Highest temperature recorded in Phoenix Park, Dublin, since 1887: 33ºC recorded in July 2022 (Met Éireann, 2022);
- Highest daily rainfall recorded in the last 10 years was 67 mm in November 2025 (Met Éireann);
- Low temperature event: Ireland experienced its coldest December since 2010, with severe frosts, ice days and snowfall affecting large parts of the country during the first half of the month (Met Éireann, 2023); and
- Flood Event: Heavy rainfall associated with Storm Antoni caused flash flooding across parts of Dublin on 5 August 2023. Met Éireann reported that August 2023 was characterised by very heavy raanyinfall events which resulted in flash flooding, particularly in eastern areas of the country (Met Éireann, 2023).

The following factors were taken into account when identifying and assessing climate risks predicted to impact the Proposed Development - the historic baseline climate data results in Table 10-14, future baseline climate projection data based on the RCP scenarios, qualitative data on past extreme weather events above and the location of the Proposed Development. In addition to the above considerations, the types of assets and infrastructure associated with the Proposed Development were also taken into account when undertaking the CCRA. The following chronic and acute variables were deemed relevant based on the above factors:

- Temperature related: changing air temperature, temperature variability, heat stress;
- Wind related: changing wind patterns, increase in storm events; and
- Water related: changing precipitation patterns, sea level rise, heavy precipitation, fluvial flooding, coastal flooding, pluvial flooding and groundwater flooding.

10.4.3 Future Receiving Environment

This section highlights the predicted climate trends that are expected to be experienced across the Island of Ireland, as well as those at a more local level to the Proposed Development. Table 10-12 and Table 10-13 present the qualitative findings for projected climate trends in Ireland, while Table 10-14 shows the quantitative climate change projection data for the Proposed Development.

Qualitative Climate Change Project Data

Future trends for key climate variables in Ireland are summarised in Table 10-12, based on information from Climate Ireland which outlines both observed and projected climatic changes at a national scale. Considering these national climate projections enables a more comprehensive assessment of the climate hazards and extreme weather events that are increasing in frequency and intensity across Ireland. These climate variables should be considered when assessing the hazards that could impact the Proposed Development in the future.

Table 10-12: Key Trends - Climate Change Projections for Ireland

Climate Variable	Key Trend	Key Message
Surface air temperature	Average surface air temperatures are expected to increase everywhere and across all seasons.	An increase in the intensity and duration of heatwaves is expected.
Precipitation	An increase in seasonality in precipitation can be expected with significant decreases projected for spring and summer and increases for winter.	An increase in the occurrence of extreme rainfall events is likely.

Climate Variable	Key Trend	Key Message
Hydrology	Increasing seasonality in hydrological regimes can be expected with decreased summer and increased winter flows likely.	Flood risk is expected to increase across Ireland while increases in the frequency of drought conditions is also expected.
Windspeed	An increase in the intensity of extreme windstorms is expected.	Projections indicate a decrease in wind speeds for summer and increase for winter.
Sea level rise	Sea levels are expected to increase for all Irish coastal areas.	Projected changes in sea level will magnify the impacts of changing storm surge and wave patterns in coastal areas.
Waves and surges	A decrease in mean and extreme wave heights is expected by the end of the century.	The magnitude and intensity of storm wave heights are expected to increase.

Storms and associated high wind speeds are a major natural hazard risk for many countries across Europe. For example, Ireland has been severely affected by an exceptional number of storms over the last 10 years, causing serious coastal damage and widespread, persistent flooding. Future projections show an increase in the number of very intense winter storms over Ireland from the middle of the century. It should be noted that because extreme storms are rare events, storm projections should be considered with a level of caution.

The number of very intense storms is projected to increase over the North Atlantic region in the future (2041-2060), under RCP 8.5. Projections suggest that the winter track of these storms may extend further south and over Ireland more often. Under RCP 4.5, the projections of future intense storm tracks have a similar, but weaker signal.

Met Éireann's report 'Ireland's Climate Averages 1991-2020' (Met Éireann, 2023) gives a comparison of the two 30-year time periods 1961-1990 and 1991-2020. This report outlines the climate averages for the period 1991-2020 for a range of parameters including air temperature, precipitation, sunshine and wind, in addition to giving a comparison against the previous reference period 1961-1990. By comparing the two reference periods and the observed trends it gives an indication into the climate trends that can be expected in the next 30-year reference period and reinforces the quantitative trends that are displayed in Table 10-14. Table 10-13 outlines some of the key climate trends that were observed in this reference period compared to those reported in 1961-1990.

Table 10-13: Observed Changes in Ireland's Climate Averages between 1991-2020 and 1961-1990

Climate Variable	Observed Change
Annual Mean Temperature	Comparing the 1991-2020 annual mean air temperature for Ireland with that of the 1961-1990 period, there has been an increase of approximately 0.7°C.
Seasonal Mean Temperature	Mean air temperature has increased in all seasons. Spring shows the highest increase of approximately 0.8°C.
Annual Rainfall	Annual average rainfall has increased by approximately 7% between the periods 1961-1990 and 1991-2020. Almost all regions have observed an increase in annual average rainfall between the two 30-year periods.
Seasonal Rainfall	All seasons show a percentage increase in average rainfall amounts between the periods 1961-1990 and 1991-2020, although it should be noted that there were large regional variations. Summer rainfall had the greatest increase at 12%, with July experiencing the biggest variability of 22% between the two periods. Winter rainfall has increased by 7% between the two 30-year periods.
Number of Rain Days	There has been an increase in the average annual number of rain days, wet days and very wet days observed between the 1961-1990 and 1991-2020 periods. At a seasonal level winter, summer and autumn show an increase in the number of rain days, wet days and very wet days.

Quantitative Projections

The quantitative climate change projection data for the Proposed Development Site is presented in Table 10-14, alongside the historic climate baseline data for the area. The historic time period is 1981-2010 and the projection period is 2021-2050 (to cover the construction phase and the operational phase) and 2041-2070 and 2071-2100 (to cover the operational phase only).

Table 10-14: Climate Change Baseline and Projection Data for Casement Aerodrome

Climate Variable	Baseline (1981-2010) Casement Aerodrome Weather Station	Climate Change Projection						Projected Trend	Source
		Moderate Scenario RCP4.5 (2021-2050)	Moderate Scenario RCP4.5 (2041-2070)	Moderate Scenario RCP4.5 (2071-2100)	Extreme Scenario RCP8.5 (2021-2050)	Extreme Scenario RCP8.5 (2041-2070)	Extreme Scenario RCP8.5 (2071-2100)		
Temperature									
Mean annual maximum daily temperature (°C)	13.4	0.45 (0.02 to 0.76)	0.71 (0.18 to 1.31)	1.11 (0.67 to 1.75)	0.56 (0.24 to 0.98)	1.15 (0.75 to 1.60)	2.33 (1.55 to 2.99)	↑	Met Éireann/ Climate Ireland
Mean annual minimum daily temperature (°C)	5.9	0.68 (0.30 to 1.05)	0.97 (0.48 to 1.63)	1.39 (0.95 to 2.13)	0.81 (0.56 to 1.18)	1.44 (1.11 to 1.85)	2.68 (1.97 to 3.40)	↑	Met Éireann/ Climate Ireland
Mean summer maximum daily temp (°C)	18.9	0.47 (0.10 to 0.98)	0.82 (0.21 to 1.39)	1.21 (0.64 to 1.90)	0.58 (0.10 to 1.25)	1.30 (0.88 to 1.70)	2.54 (1.85 to 3.26)	↑	Met Éireann/ Climate Ireland
Mean winter minimum daily temperature (°C)	2.4	0.30 (-0.11 to 0.60)	0.56 (0.04 to 1.12)	1.01 (0.54 to 1.50)	0.45 (0.11 to 0.77)	1.00 (0.59 to 1.45)	2.17 (1.39 to 2.81)	↑	Met Éireann/ Climate Ireland
Highest temperature for baseline period (°C)	31.0	-		-	-	-	-	-	Met Éireann/ Climate Ireland
Lowest temperature for baseline period (°C)	-15.7	-		-	-	-	-	-	Met Éireann/ Climate Ireland
Rainfall									
Mean annual rainfall levels (mm)	754.23	18.31% (12.49 to 23.15%)	17.95% (12.51 to 23.91%)	20.25% (17.05 to 26.37%)	18.32% (13.13 to 23.98%)	20.55% (14.66 to 26.95%)	24.68% (19.33 to 32.73%)	↑	Met Éireann/ Climate Ireland

Climate Variable	Baseline (1981-2010) Casement Aerodrome Weather Station	Climate Change Projection						Projected Trend	Source
		Moderate Scenario RCP4.5 (2021-2050)	Moderate Scenario RCP4.5 (2041-2070)	Moderate Scenario RCP4.5 (2071-2100)	Extreme Scenario RCP8.5 (2021-2050)	Extreme Scenario RCP8.5 (2041-2070)	Extreme Scenario RCP8.5 (2071-2100)		
Mean summer rainfall (mm)	189.5	4.08% (-4.14 to 12.32%)	2.28% (-6.57 to 12.68%)	1.56% (-8.68 to 9.56%)	2.59% (-4.40 to 12.77%)	-0.17% (-8.24 to 11.07%)	-1.99% (-14.90 to 10.97%)	↑↓	Met Éireann/ Climate Ireland
Mean winter rainfall (mm)	187.76	33.20% (23.25 to 40.13%)	32.68% (25.96 to 42.34%)	38.77% (29.06 to 45.62%)	33.09% (25.85 to 44.73%)	39.93% (27.56 to 49.88%)	47.45% (32.31 to 65.20%)	↑	Met Éireann/ Climate Ireland
Wettest month on average (mm)	October (81.26)			-	-	-	-	-	Climate Ireland
Driest month on average (mm)	February (48.37)			-	-	-	-	-	Climate Ireland
Highest daily rainfall (mm) for baseline period	108.6			-	-	-	-	-	Climate Ireland
Other									
Mean wind speed (knot)	10.72	Projections from Climate Ireland suggest an increase in the intensity of extreme windstorms is expected. Projections indicate a decrease in wind speeds for summer and increase for winter. Projections indicate a decrease in the numbers of less intense storms for Ireland with an increase in more intense storms which are rare events. However, due to a limited number of studies, these projections should be considered with a high level of caution.						↑	Climate Ireland
Storm surges	N/A	Storm surges, particularly in combination with extreme waves, pose an increasing risk to Ireland. However, projections of changes in storminess and extreme wave heights are uncertain. Significant wave heights (the highest third of all waves) are projected to decrease around Ireland during the remainder of the century. However, the future behaviour of extreme waves around Irish coasts is considerably less certain, with studies showing everything from decreases to increases in wave heights. Expected surge levels for events of a 20 to 30-year return period are likely to increase by up to 9cm by 2100.						↑	Climate Ireland
Heatwaves	N/A	An increase in the intensity and duration of heatwaves is expected.						↑	Climate Ireland
Wildfires	N/A	ThinkHazard has classified the wildfire hazard level in Dublin as Low, according to currently available information. Modelled projections of future climate identify a likely increase in the frequency of fire weather occurrence across						↑	ThinkHazard

Climate Variable	Baseline (1981-2010) Casement Aerodrome Weather Station	Climate Change Projection						Projected Trend	Source
		Moderate Scenario RCP4.5 (2021-2050)	Moderate Scenario RCP4.5 (2041-2070)	Moderate Scenario RCP4.5 (2071-2100)	Extreme Scenario RCP8.5 (2021-2050)	Extreme Scenario RCP8.5 (2041-2070)	Extreme Scenario RCP8.5 (2071-2100)		
		Ireland, including an increase in temperature and greater variance in rainfall, however there is a slightly lower risk around Dublin.							
Drought	N/A	Extended dry periods, of 5 plus days with less than 1 mm of precipitation recorded, will become more common in Ireland due to climate change. There is an increased risk that droughts will become more regular, longer and with potential for multi-year droughts. Summer rainfall may decrease by approximately 9%, potentially causing water shortages and affecting agriculture.						↑	Climate Ireland
Sea level rise (m)*	-	0.06 to 0.15	0.15 to 0.28	0.34 to 0.51	0.06 to 0.16	0.15 to 0.29	0.38 to 0.58	↑	IPCC AR6 Sea Level Projection Tool

**10th-90th percentile range*

10.5 Embedded Mitigation Measures

10.5.1 Lifecycle GHG Assessment

A number of mitigation measures will be embedded through the construction and operation phases of the Proposed Development to manage environmental and climate-related risks. The following measures to reduce carbon in design have been employed as per the Stage 2A Structural Engineering Report submitted with this Planning Application

- **Optimise structural typology** – Structural elements and options have been assessed, with embodied carbon being a valuable criteria in selected the most appropriate option.
- **Reduce or remove basement structures** – No basements have been proposed for the Proposed Development to reduce the overall carbon footprint.
- **Minimise use of energy intensive materials** – A minimum of 30% clinker replacement with low-carbon secondary cementitious materials will be included in the specification for structural concrete.

Additionally, an Outline Construction Environmental Management Plan (oCEMP) will be produced to outline measures governing construction activities and minimising environmental impacts. A detailed CEMP with be prepared by the appointed contractor prior to construction.

It should be noted that carbon reductions resulting from the mitigation measures listed above may not be realised in the emissions totals presented within Section 10.6.1 due to the unavailability of material quantities for the GHG assessment.

10.5.2 Climate Change Risk Assessment and In-Combination Climate Change Impact Assessment

10.5.2.1 Construction Phase

One of the key regulations for construction in Ireland is the Irish Safety, Health, and Welfare at Work (Construction) Regulations 2013 (Government of Ireland, 2013). The appointed contractors, designers, workers and other construction stakeholders shall comply with all rules set out in this regulation, during the construction process. This regulation sets out a number of standards and mitigation measures which must be met on the construction site. These measures will act as embedded or planned controls for safety and health concerns and risks arising from climate change during construction. Examples of such measures are as follows:

- “A contractor responsible for a construction site shall ensure for that site that adequate precautions are taken in any excavation, shaft, earthwork, underground works or tunnel to…guard against the occurrence of fire or flooding…”
- “A contractor responsible for a construction site shall ensure for that site, prior to the commencement of demolition work and during the progress of the work, that appropriate steps are taken to prevent danger to persons at work and others on the site from risk of — (a) fire or explosion through leakage or accumulation of flammable liquids, gas or vapour, and (b) flooding.”
- “…a contractor responsible for a construction site shall provide or cause to be provided at or in the immediate vicinity of the site for the use of persons at work and conveniently accessible to them— (a) adequate and suitable enclosed accommodation for taking shelter during interruptions of work owing to bad weather…”
- “Every person engaged in work to which these Regulations apply shall —…make proper use of any safety helmet, harness or any other personal protective equipment provided for the person’s safety and health,…”

Regulation 12 of the Safety, Health, and Welfare at Work (Construction) Regulations 2013 (Government of Ireland, 2013) states that the Project Supervisor for the design process (PSDP) must prepare a Preliminary Health and Safety Plan. This plan must identify any exceptional features of design and construction, including any risks associated with climate impacts during construction.

Regulation 16 of the Safety, Health, and Welfare at Work (Construction) Regulations 2013 (Government of Ireland, 2013) states that the Project Supervisor for the construction stage, based on the findings in the Preliminary Health and Safety Plan, will further develop a Safety and Health Plan for the construction period, prior to commencement of works on site. This will also take into consideration risks associated with the impacts of climate change.

As detailed above an oCEMP will be prepared for submission with the Proposed Development planning application. A detailed CEMP will be prepared by the construction contractor. The contractor's CEMP will identify current construction environmental risks within and around the environment of the Proposed Development construction site, in addition to outlining the associated controls that will be adopted during construction. The CEMP will provide site specific recommendations and refer to general best practice procedures to comply with when construction wors are carried out.

10.5.2.2 Operational Phase

A number of operational planned control measures have also been captured while undertaking this CCRA. Some such measures include:

- Residential dwellings and substation building will be above the breach flood level to mitigate risks from pluvial and fluvial flooding;
- Sustainable drainage systems (SuDS) measures will be implemented across the development as part of the drainage strategy as a sustainable adaptation measure to reduce flood risk;
- An FRA has been completed to inform a suitable surface water drainage strategy, with a drainage network designed to accommodate a 1 in 100-year rainfall event, plus a 20% climate change allowance;
- The Proposed Development has been designed in line with the South Dublin County Development Plan (SDCC, 2022) and the Planning System & Flood Risk Management Guidelines (Government of Ireland, 2019) core objectives and policies, to promote urban design benefits;
- Native and some (relatively) drought tolerant plant species are included in the planting palette. Irrigation will be required during plant establishment and then kept as a back-up to be used during prolonged hot and dry periods in the long-term;
- Buildings and structures will be built in line with the design standard, such as Eurocode EN 1991-1-4, for wind loading;
- Building layouts and designs will consider ways to maximise daylight and natural ventilation, reducing impacts from extreme heat;

10.6 Potential Impacts

10.6.1Lifecycle GHG Assessment

Emissions from the construction and operation of the Proposed Development have been broken down by activity and are shown in Table 10-15.

Table 10-15: Project Lifecycle GHG Emissions

Lifecycle Stage	GHG Emissions (tCO_2e)	Proportion of GHG Emissions
Construction stage (A1-5)	5,802	25%
Maintenance and repair (including waste, transport, commuting) (B2-5)	2,308	10%
Operational energy use (B7)	4,706	20%
User's utilisation (B8)	10,791	46%
Total Emissions	**23,606**	

10.6.1.1 Construction Period

As discussed in Section 10.3.1.4, in order to contextualise the construction emissions, Ireland's Carbon Budgets and Ireland's Industry Sectoral Emission Ceiling (Government of Ireland, 2022b) have been used as a proxy to determine the significance of emissions during construction between 2027 to 2029. Construction phase emissions have been compared to both Irish national budgets (Table 10-16) and sectoral emissions ceilings (Table 10-17).

The construction emissions in comparison to Ireland's Industry Sectoral Emission Ceiling only account for 0.021% of the relevant carbon budget.

Table 10-16: Construction Emissions Compared to Ireland's Carbon Budgets

Carbon Budget	Ireland Carbon Budget ($MtCO_2eq$)	Project Emissions (tCO_2e)	Percentage Contribution of Ireland's Budget Emissions (%)
Carbon Budget 2 (2026 – 2030)	200	5,804	0.003%

Table 10-17: Construction Emissions Compared to the Relevant Ireland's Industry Sectoral Emission Ceiling

Carbon Budget	Ireland's Industry Sectoral Emission Ceiling ($MtCO_2eq$)	Project Emissions (tCO_2e)	Percentage Contribution of Ireland's Industry Sectoral Emissions Ceiling (%)
Carbon Budget 2 (2026 – 2030)	27.45	5,804	0.021%

There is likely to be substantial decarbonisation of materials within global supply chains with improvements in technology and low carbon fuels[1]. However, it is challenging to understand to what extent measures to decarbonise the supply chain will have been implemented by the time the Proposed Development is being constructed. The figures for construction presented here therefore represent an estimate of the GHG emissions resulting from industry standard practices in 2025 as presented in the FHH benchmarking report (FHH, 2025).

As material manufacturing technologies improve, and government policy relating to GHG emissions from construction and transport continues to evolve, all future construction activities will be required to comply with existing and future legislation. Furthermore, construction phase GHG emissions are not expected to materially impact Ireland's net zero target for 2050 due to the scale of development and typical carbon intensity of residential developments of this type.

For these reasons, and taking into account the mitigation measures as outlined in Section 10.5.1, the significance of Proposed Development construction phase emissions can be evaluated as Minor Adverse and Not Significant.

10.6.1.2 Operational Period

As discussed in Section 10.3.1.4, in order to contextualise the Proposed Development's operational emissions, they have been compared against Ireland's Carbon Budget's. The impact of the Proposed Development has been further contextualised by comparing the CO_2e emissions with the projected Built Environment - Residential Emissions Trajectory for each of the Assessment Years (under the With Additional Measures scenario). As explained in Section 10.3.1, the more ambitious of the two scenarios (With Additional Measures) has been used here as a proxy for the trajectory as it presents a more conservative, worst-case scenario.

[1]IEA (2023). Net Zero Roadmap: A Global Pathway to Keep the 1.5 °C Goal in Reach - 2023 Update. Available at: https://iea.blob.core.windows.net/assets/4ad26550-05c4-4495-9891-98e588cd0be8/NetZeroRoadmap_AGlobalPathwaytoKeepthe1.5CGoalinReach-2023Update.pdf

As shown in Table 10-18 and

Table 10-19, The Proposed Development's operational emissions only account for <0.001% and 0.001% of the National Carbon Budgets and no more than 0.018% of any sector specific budget to 2050.

Table 10-18: Operational GHG Emissions Contribution to Ireland's Carbon Budgets

Carbon Budget	Ireland Carbon Budget ($MtCO_2eq$)	Project Emissions (tCO_2e)	Percentage Contribution of Ireland's Budget Emissions (%)
Carbon Budget 2 (2026 – 2030)	200	243	<0.001%
Carbon Budget 3 (2031 – 2035)	151	1,484	0.001%

Table 10-19: Operational GHG Emissions Contribution to Ireland's Built Environment - Residential Emissions Trajectory

Carbon Budget	Ireland Sectoral 'with additional measures' Trajectory ($MtCO_2eq$)	Project Emissions (tCO_2e)	Percentage Contribution of Ireland Built Environment – Residential Emissions Trajectory (%)
2026 – 2030	27.45	297	0.001%
2031 – 2035	24.17	1,484	0.006%
2036 – 2040	19.28	1,484	0.008%
2041 – 2045	13.73	1,484	0.011%
2046 – 2050	8.31	1,484	0.018%

Operational emissions are primarily driven by user's utilisation (61%), energy consumption (26%) and maintenance and repair emissions (13%).

Electrical operational energy use GHG emissions are outside the direct control of the Applicant and are driven primarily by emissions associated with electrical generation from the Irish and global energy network.

In alignment with the Climate Action and Low Carbon Development (Amendment) Act 2021, Ireland is on a legally binding path to net zero emissions no later than 2050. Additionally, Ireland is committed to a 51% reduction in GHG emissions by the end of this decade.

As part of this commitment, the Irish Government in 2022[2] reached an agreement on Sectoral Emissions Ceilings that aims to limit Sectoral Emissions from:

- Built Environment - Residential : 19% reduction in emissions by 2030 relative to a 2018 baseline.

In order to achieve this goals, the Climate Action Plan (2025) sets out a preliminary net zero pathway for the Built Environment - Residential Sector, which establishes the required measures and actions.

For the Built Environment - Residential Sector, the Climate Action Plan identifies measures to reduce emissions including:

1. Replace gas boilers with heat pumps in existing and new buildings;
2. Implement residential energy efficiency programmes in line with the National Development Plan (2025); and

[2]Department of the Taoiseach (2022). Government announces sectoral emissions ceilings, setting Ireland on a pathway to turn the tide on climate change. Available at: https://www.gov.ie/en/press-release/dab6d-government-announces-sectoral-emissions-ceilings-setting-ireland-on-a-pathway-to-turn-the-tide-on-climate-change/

3. Expansion of two district heating schemes currently under development to reach a combined capacity of 0.074 terawatt-hour (TWh) by 2030.

Furthermore, for the Commercial and Public Sectors, the Climate Action Plan advises that building regulations will result in new buildings meeting the Nearly Zero Energy Building (and in the future, Zero Energy Buildings) regulation.

Therefore, in compliance with the Irish Government's legally binding commitment to net zero emissions no later than 2050, future anticipated building regulations and the embedded sustainability measures, operational emissions are expected to decarbonise by 2050. It is considered that the Proposed Development's GHG emissions during operation are fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type, as per ISEP guidance (ISEP, 2022). Therefore, it is considered that the operational GHG emissions from the Proposed Development are Minor Adverse and Not Significant.

10.6.2 Climate Change Risk Assessment

Using the climate change projection data gathered in Table 10-14, climate risks have been identified (e.g. increased risk of heat stress on construction workers) using the climate hazards deemed to be relevant to the Proposed Development (e.g. increased frequency and intensity of summer heatwaves).

For each climate risk identified, the asset components impacted have been noted and the planned or embedded controls listed. In this instance, embedded or planned controls represent measures that were already included in the design of the Proposed Development that work to mitigate climate risk. With this information, an initial assessment of climate change risk has been undertaken based on an analysis of likelihood and consequence.

Climate risks were first assessed to determine their likelihood of occurrence using the likelihood matrix in Table 10-6, and then, should they occur, the level of consequence this would have on the Proposed Development using the level of consequence matrix in Table 10-7.

A total of 16 climate risks have been identified, seven of which occur during the construction phase of the Proposed Development, with nine during the operational phase. The CCRA is presented in Appendix 10-1. Climate risks include potential increased heat stress on construction workers and occupants, and increased risk of damage of construction equipment from flooding and storm events.

The construction and operational climate risks were then assessed against RCP 4.5 and RCP 8.5. Table 10-20 displays the initial risk profile for the Proposed Development under both RCP scenarios. There are zero climate risks which fall under the 'Significant' category for the RCP 4.5 scenario and one risk rated as 'Significant' under RCP 8.5 (2071-2100).

Table 10-20: Initial Risk Profile for the Proposed Development

Risk Rating	Moderate Emissions Scenario RCP 4.5 2021 - 2050	Moderate Emissions Scenario RCP 4.5 2041 - 2070	Moderate Emissions Scenario RCP 4.5 2071 - 2100	High Emissions Scenario RCP 8.5 2021 - 2050	High Emissions Scenario RCP 8.5 2041 - 2070	High Emissions Scenario RCP 8.5 2071 - 2100
Construction						
Low	6	-	-	6	-	-
Medium	1	-	-	1	-	-
High	0	-	-	0	-	-
Extreme	0	-	-	0	-	-
Operation						
Low	4	3	3	3	3	1
Medium	5	6	6	6	6	7
High	0	0	0	0	0	1
Extreme	0	0	0	0	0	0

10.6.3 In-Combination Climate Change Impact Assessment

The ICCI Assessment was carried out to identify and assess the combined impact of the Proposed Development and future climate change on receptors in the surrounding environment. This ICCI Assessment was undertaken to meet industry best practice standards established by the ISEP.

Appendix 10-2 presents the findings of the ICCI Assessment, which has taken into account cultural heritage, land, soils and geology, noise and vibration, water and hydrology, material assets (utilities)/water infrastructure, material assets (utilities) /electricity infrastructure) and air quality as receptors.

The assessment identified 16 total potential ICCIs across Air Quality, Material Assets, Water and Hydrology, Land, Soils & Geology, and Cultural Heritage. None of were considered to be significant given the criteria presented in Section 10.3.3.

10.7 Mitigation Measures

The following mitigation measures are proposed in addition to the embedded controls as described in Section 10.5 to reduce the residual climate risk associated with the Proposed Development.

10.7.1 Greenhouse Gas Assessment

Due to the methodology employed to estimate the GHG emissions associated with the Proposed Development, it is not possible to determine the specific materials or activities responsible for carbon hotspots within the assessment or recommend additional measures to mitigate the overall carbon impact.

It is considered that the mitigation measures and carbon reduction principles outlined in Section 10.5.1 are sufficient to align the Proposed Development with Ireland's net-zero trajectory.

10.7.2 Climate Change Risk Assessment

10.7.2.1 Construction Phase

A number of further mitigation measures during the Proposed Development construction phase have been identified when undertaking the CCRA, including the following:

- A water pump for the areas with critical infrastructure and a key part of construction operations should be installed. This will help increase the sites surface drainage capacity and reduce the risk associated with fluvial and pluvial flooding;
- Raise critical infrastructure to be above PMF (probable maximum flood) to reduce the consequence of impact for potential flood events;
- Undertake regular monitoring of trees and vegetation in the area, pruning as necessary to avoid damage to the construction site or blocking access roads, in the event of a storm with high wind speed;
- Installing additional attenuation storage tanks at key locations or identified flood risk areas, to increase the proposed developments drainage capacity;
- Construction materials and equipment with superior properties that offer increased tolerance to fluctuating temperatures, heavy precipitation and other extreme weather events such as storms, should be used, where feasible, e.g. construction equipment that can withstand conditions greater than 40°C;
- Provide all outdoor construction workers access to indoor facilities, air conditioning, breaks in shaded areas and water breaks to ensure suitable working conditions;
- Cease outdoor and non-essential work if working conditions are too dangerous and could result in injury to workers and damage to equipment; and
- Employ adequate cooling and ventilation systems in the design of temporary office buildings and construction worker facilities, that's sufficient to deal with projected increases in extreme temperatures.

10.7.2.2 Operational Phase

A number of further mitigation measures during the Proposed Development operational phase have been identified when undertaking the CCRA, including the following:

- Consider introducing a drainage maintenance and operation plan, for the drainage system to be monitored and kept blockage free;
- Consider re-paving key areas with a permeable material to allow water to be absorbed into the ground and not gather on the surface area;
- Consider HVAC or air-conditioning systems for the substation building to prevent overheating of electrical equipment
- It is recommended that critical infrastructure is raised above PMF (probable maximum flood) level;
- If applicable undertake regular monitoring of trees and vegetation in the area, pruning as necessary to avoid damage to the Site, in the event of a storm with high wind speed;
- Weather forecasts should be monitored and an early warning system should be in place at the proposed development. This will allow for contingency plans to be put in place in advance of predicted extreme heat and cold events; and
- Where necessary and feasible, external shading devices should be favoured over glazing solar coatings as this will allow for sunlight to be absorbed in winter, but reflected in summer; and
- High efficiency heating, ventilation, and air conditioning (HVAC) systems and high efficacy lighting with occupancy and daylight control where applicable, particularly around vulnerable equipment (e.g. substation).

10.8 Residual Impacts

10.8.1 Lifecycle GHG Assessment

The emissions figures presented in Section 10.6.1 are considered to be residual. A number of GHG emission mitigation measures have been embedded within the design of the Proposed Development to reduce the magnitude of GHG emissions to a level that is competitive with Ireland's net-zero trajectory. As a result, no additional mitigation measures are anticipated to be required. Residual effects are summarised in Table 10-21.

10.8.2 Climate Change Risk Assessment

No significant residual effects have been identified by the CCRA. A number of climate resilience measures have been embedded within the design of the Proposed Development. Additional adaptation measures are required to reduce the consequence level from Moderate to Minor for the significant initial risk rating of storm events under an RCP8.5 scenario (2071-2100). Residual effects are summarised in Table 10-21.

10.8.3 In-combination Climate Change Impact Assessment

No significant residual effects have been identified for the ICCI Assessment. A number of climate resilience measures have been embedded within the design of the Proposed Development. As a result, additional mitigation measures are not anticipated to be required. Residual effects are summarised in Table 10-21.

Table 10-21: Summary of Residual Effects for the CCRA, ICCI and GHG

Receptor	Description of Effect(s)	Nature of Effect/ Geographic Scale	Magnitude of Effect	Initial Classification of Effect (with embedded control)	Additional Mitigation	Residual Effect Significance
GHG						
Global climate	Increase of GHG emissions as a result of construction and operation.	Adverse, Direct/indirect, long term and global.	Construction and operation of the Proposed Development will result in GHG emissions. There will be embodied carbon in the materials and fuels used for the construction of the Proposed Development. There will also be GHG emissions arising during the operation of the Proposed Development. In accordance with the ISEP guidance the effect is deemed to be minor adverse as the Proposed Development should not meaningfully impact Ireland's pathway to net-zero.	Since the effect is deemed to be minor adverse it is deemed to be Not Significant, because the Proposed Development's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve Ireland's trajectory towards net zero.	As the effect is assessed as Not Significant, no additional mitigation measures beyond the embedded measures described in Section 10.5.1 are required.	Not Significant
CCRA						
The Proposed Development (during both construction and operation) and associated users (e.g. construction and maintenance workers).	The increase of extreme weather events and increase in temperatures in Ireland could lead to detrimental impacts on the Proposed Development.	Adverse, Direct, Temporary (Short-term) and long term, Local.	While there may be impacts on the Proposed Development as a result of climate change, most effects are anticipated to be of low or medium risk and can be managed through embedded mitigation measures,	Significant. The effect is likely to be Significant due to storm events.	Since the likely effects are deemed Significant, additional mitigation measures are required.	Not Significant The residual effects are Not Significant as the adaptation measures recommended reduce the consequence of storm events from Moderate to Minor,

Receptor	Description of Effect(s)	Nature of Effect/ Geographic Scale	Magnitude of Effect	Initial Classification of Effect (with embedded control)	Additional Mitigation	Residual Effect Significance
			resulting in a not significant effect. However, storm events have been identified as a high risk climate variable prior to recommended adaptation measures.			reducing the risk from high to medium.
ICCI						
Identified receptors by the relevant environmental teams.	The increase of extreme weather events and increase in temperatures in Ireland could lead to detrimental impacts on environmental receptors surrounding the Proposed Development.	Adverse, Direct, Temporary (Short-term) and long-term, Local.	While there may be impacts on the Proposed Development as a result of climate change (and the combination of the Proposed Development for the ICCI), it is anticipated that the magnitude of these impacts will be managed as necessary through embedded mitigation measures.	Not significant Due to the magnitude of the effect, the effect is likely to be Not Significant.	Since the likely effects are deemed Not Significant, no additional mitigation measures are required.	Not Significant

10.9 Cumulative Impacts

10.9.1 Lifecycle GHG Assessment

The GHG emissions assessment is inherently cumulative for the following reasons:

- The environmental impact arising from GHGs is the aggregation and increased concentration of GHGs within the atmosphere;
- The location of the emissions source is not relevant to the impact arising from it; any development leading to GHG emissions has the same impact whether it is located near to the Proposed Development or in another region/country; and
- Impacts on a given location arise from the aggregated GHG levels in the atmosphere, not from the magnitude of GHG emissions in the local area.

Any attempt to compile a cumulative assessment of GHG emissions would have to include all development projects in Ireland (as the impact of GHG is not related to their emission location) and for this reason the approach for managing the cumulative GHG emissions across Ireland is through the adoption of national carbon budgets.

The inappropriateness of undertaking a cumulative appraisal (other than by contextualising against Carbon Budgets) is reflected in the ISEP GHG assessment guidance (ISEP, 2022). This guidance notes that "*effects from specific cumulative projects…should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other*". Therefore, the GHG assessment has considered whether the carbon emissions from the Proposed Development will have a material impact on Ireland's ability to meet its carbon reduction target, including its carbon budgets - this is presented in Section 10.3.1.4.

10.9.2 Climate Change Risk Assessment

Cumulative effects are not applicable to the CCRA, as the assessment considers the effects of future climate change on the Proposed Development itself.

10.9.3 In-combination Climate Change Impact Assessment

Cumulative effects are not within the scope of an ICCI assessment as it considers the influence of climate change on existing risks identified to the surrounding environmental receptors within their respective technical chapters of this ES.

10.10 Summary

10.10.1 Lifecycle GHG Assessment

The significance of the GHG emissions resulting from the Proposed Development has been evaluated via a qualitative assessment against known policy and best practice. This approach is consistent with the guidance published by ISEP (2026).

The climate impact of the Proposed Development is considered to be Minor Adverse and Not Significant due to the mitigation measures outlined in Section 10.5.1 and the negligible impact it will have on Ireland's ability to achieve its net-zero goals. Furthermore, the Climate Action Plan (2025) (Government of Ireland, 2025) sets out a preliminary net zero pathway for the Built Environment – Residential Sector, providing a policy framework for emissions reductions within the sector.

10.10.2 Climate Change Risk Assessment

The CCRA has identified a number of climate risks during the construction and operational phases of the Proposed Development. A total of 16 climate risks were identified, with the overarching climate risks relating

to flooding and storm events. The initial risk rating took into account any existing embedded controls, as those climate risks which did not have embedded controls were generally rated higher than those which did. One significant climate risk was identified, namely storm events. However, through recommended adaptation measures described in Section 10.7, the residual effect is deemed to be Not Significant.

10.10.3 In-combination Climate Change Impact Assessment

The ICCI Assessment identified a total of 16 potential impacts, none of which were found to be Significant.

10.11 References

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