Shannon Technology and Energy Park (STEP) Power Plant

Environmental Impact Assessment Report - Volume 2

Chapter 15 Climate

Shannon LNG Limited

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Delivering a better world

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15.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) describes the likely significant effects from the Proposed Development upon climate change, as well as the likely significant effects of climate change upon the Proposed Development.

The Site is located in the townlands of Kilcolgan Lower and Ralappane, between Tarbert and Ballylongford, Co. Kerry. The application Site boundary ('red line') encloses an area of approximately 41 hectares (ha) and is entirely owned by the Applicant.

Full details on the background, Site history and the Proposed Development is provided in **Chapter 02** (Description of the Proposed Development) and the Planning Statement submitted with this planning application.

The Climate Action and Low Carbon Development (Amendment) Act 2021, passed by the Oireachtas in July 2021, commits Ireland to becoming a carbon-neutral economy by no later than 2050. To reach this milestone a series of five-year carbon budgets, setting out a carbon reduction trajectory for Ireland, are to be embedded into law. The first two budgets must demonstrate a 51% reduction against a 2018 baseline by 2030.

A key component of meeting this reduction target is the decarbonisation of electricity generation in Ireland. To drive this change Ireland has set a target to generate 80% of grid electricity from renewable sources by 2030, largely from wind. To allow this uptake of renewable energy to happen it is necessary to have in place sources of energy generation that can be efficiently dispatched to cover any imbalances in supply and demand. As the use of coal and peat for electricity generation is reduced, natural gas has been identified as a relatively lower-carbon option to provide security of supply.

15.2 Competent Expert

This assessment has been led and verified by Ben Murray, an Associate Director in AECOM's Carbon and ESG Practice, BSc (Hons), CEnv, MIEMA. Ben has over 20 years' of experience in environmental management and carbon accounting, and specialises in greenhouse gas and climate change assessments for large infrastructure projects across multiple sectors, including power (generation, transmission and distribution), rail, highways and water.

15.3 Scope of Assessment

The assessment of climate impacts is divided into three categories:

- **Lifecycle Greenhouse Gas (GHG) Assessment:** to identify the magnitude of GHG emissions arising over the life of the Proposed Development on the climate.
- **In-combination Climate Change Impact (ICCI) assessment:** the combined impacts of the Proposed Development and future climate change on receptors in the surrounding environment.
- **Climate Change Resilience (CCR):** the vulnerability of the Proposed Development to the impacts of future climate change.

15.4 Legislation and Guidance

This section identifies and briefly describes the legislation, policy, and guidance of relevance to the assessment of potential impacts associated with the construction and operation of the Proposed Development on the climate and the impacts of climate change on the Proposed Development.

Legislation, policy and other relevant guidance has been considered on an international, national and local level. The following is relevant to the GHG, ICCI and CCR assessments as it has either influenced the sensitivity of receptors and requirements for mitigation or the scope and / or methodology of the assessment.

15.4.1 International Legislation and Policy

- **EIA Directive 2014/52/EU** (Official Journal of the European Union, 2014) amending Directive 2011/92/EU: on the assessment of the effects of certain public and private projects on the environment. Annex IV specifically requires that Environmental Impact Assessments (EIA) require information to be included on '*the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change*'.

- **Kyoto Protocol**: An international agreement linked to the United Nations Framework Convention on Climate Change (UNFCCC), which commits its Parties by setting internationally binding emission reduction targets. Ireland is a Party to the Kyoto Protocol and its emission reductions targets are now binding. Under Article 4 of the Kyoto Protocol, the EU created an Effort Sharing Regulation that requires the setting of individual binding GHG emission reduction targets for each of its Member States. The current Effort Sharing Decision (ESD) commits Ireland to a 39% reduction in GHG emissions for the period 2021 to 2030 (Department of Communications, Climate Action & Environment, 2019).

- **Paris Agreement** (Conference of the Parties No.21, 2016): A legally-binding agreement within the UN framework convention on climate change which requires all signatories to strengthen their climate change mitigation efforts to keep global warming to below 2°C this century (UNFCCC, 2016).

- **EU Emissions Trading System** (Directive 2003/87/EC (as amended)). The EU's current binding target for 2030 is to cut greenhouse gas (GHG) emissions by at least 40% below 1990 levels. This target is split across the EU Emissions Trading System (ETS) and non-ETS sectors with consideration also for the Land Use, Land Use Change and Forestry (LULUCF) sector. Emissions from electricity generation and large industry are in the ETS. These are dealt with at EU level. The EU ETS covers more than 11,000 power stations and industrial plants (stationary installations) in 31 countries, as well as airlines that operate within the EU. It covers about 45% of EU emissions, but only about 29% of total emissions in Ireland[1]. The ETS is a 'cap and trade' system where an EU-wide limit, or cap, is set for participating installations. The cap is reduced over time so that total emissions fall. Within that limit 'allowances' for emissions are auctioned or allocated for free (outside the power-generation sector). Individual installations must report their CO_2eq. emissions each year and surrender sufficient allowances to cover their emissions. If their available allowances

[1] Climate Action Plan 2019

are exceeded, an installation must purchase allowances. On the other hand, if an installation has succeeded in reducing its emissions, it can sell any surplus allowances remaining. The EU ETS is designed to bring about reductions in emissions at least cost. To date, it has played an increasingly important role in assisting European industry to implement the type of reductions envisaged within the EU's agreed limit of at least 20% reduction of overall greenhouse gas emissions across the EU by 2020 and 43% by 2030, both relative to 2005 levels. Industrial installations with a thermal capacity of 20 Megawatts are part of the ETS. Electricity generators no longer receive a free allowance but must purchase at auction sufficient allowances to cover their annual emissions. From 2021, the overall European emissions cap will reduce by an annual rate of at least 2.2%.

- **European Green Deal:** Policy initiatives by the European Commission aiming to make Europe GHG neutral by 2050 (European Commission, 2019). Key pillars of the Green Deal include decarbonising energy systems and building climate resilience.
- **EU Effort Sharing Legislation:** Establishes binding annual greenhouse gas emission targets for Member States for the periods 2013–2020 and 2021–2030. These targets concern emissions from most sectors not included in the EU Emissions Trading System, such as transport, buildings, agriculture and waste.
- The EU Fit for 55 package was published in late 2021 with the aim of reducing EU emissions by at least 55% by 2030 compared to 1990 levels, and making the EU carbon-neutral by 2050. This EU package is a set of proposals to revise all existing EU acts on climate and energy and increase the EU target for renewables in the overall energy mix from 32% in 2030 to 40%.
- In July 2021, the EU Commission proposed a revised Energy Efficiency Directive (EED) (COM/2021/558). The recast EED, which came into force in October 2023, requires all Member States to reduce their Final Energy Consumption (FEC) demand to a specified figure by 2030.
- Following the Russian invasion of Ukraine, in May 2022 the EC proposed the REPowerEU Plan to make the EU independent from Russian fossil fuels well before 2030, starting with gas. A further Regulation (2022/1369) was published in August 2022, to coordinate demand reduction measures for gas, and implemented rules to address a situation where there are severe difficulties in the supply of gas.
- In October 2022, a Regulation (2022/1854) was published on an emergency intervention to address high energy prices. This Regulation includes measures aimed at reducing electricity usage, including through a mandatory cap on market revenues, and the distribution of surplus revenues and surplus congestion income revenues to final electricity customers. It also included a mandatory temporary solidarity contribution from EU companies with activities in the crude petroleum, natural gas, coal and refinery sectors to contribute to the affordability of energy for households and companies.

15.4.2 International Guidance and Information

- The **Greenhouse Gas Protocol** (World Resource Institute & World Business Council for Sustainable Development (WRI & WBCSD, 2004): The GHG Protocol provides standards and guidance for companies and other types of organisations in preparing a GHG inventory.
- The **International Organization for Standardization** (ISO) 14064-1:2019 and 14064-2:2019 (ISO, 2018a and b, respectively) provides specifications for organisational-level and project-level guidance for the quantification and reporting of GHG emissions and removals.
- **Institute of Environmental Management and Assessment** (IEMA) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance Assessment Methodology and Significance Criteria (IEMA, 2022): This provides a framework for the consideration of greenhouse gas emissions in the EIA process, in line with the EIA Directive. The guidance sets out how to:
  - Identify the GHG emissions baseline in terms of GHG current and future emissions.
  - Identify key contributing GHG sources and establish the scope and methodology of the assessment.
  - Assess the impact of potential GHG emissions and evaluate their significance.
  - Consider mitigation in accordance with the hierarchy for managing project related GHG emissions (avoid, reduce, substitute, and compensate).
- **IEMA** Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (IEMA, 2020): provides a framework for effective consideration of climate change resilience and adaptation in the EIA process.
- The **Inventory of Carbon and Energy** (ICE) Database (Version 3) and the Cement, Mortar and Concrete Model (Version 1), Bath University, United Kingdom (UK) (2019): The ICE Database is the world's leading source of embodied energy and carbon data. This database has been used to source appropriate carbon factors to estimate the embodied carbon of materials used for demolition and remediation works of the Proposed Development.
- **Sustainable Energy Authority of Ireland** (SEAI, 2022) provide energy conversion and emissions factors for Irish-based calculations. These factors have been used in the calculation of GHG emissions associated with the electricity and natural gas demand of the Proposed Development.
- **GHG Conversion Factors** (**Department for Energy Security and Net Zero)**, provide GHG emission factors (DESNZ, 2023), which have been used within the GHG emissions calculation methodology, as described in the 'Methodology for Determining Construction Effects' section of this EIAR chapter. These will be used as a proxy for absent Irish emission factors to quantify GHG emissions to convert the activity data into emissions.
- **Guidance for the Calculation of Land Carbon Stocks** (EC 2010): These Guidelines provide a calculation methodology for calculating carbon stocks from land use.
- **EU Technical Guidance on Climate Proofing of Infrastructure** (EC 2021b): This guidance informs the climate risk methodology used throughout this chapter.

15.4.3 National Legislation and Policy

- **S.I. No. 93 / 1999** European Communities (Environmental Impact Assessment) (Amended) Regulation, 1999. Article 25 (2) (b) of this Regulation specifically requires an environmental impact statement to contain (Irish Statute Books, 1999):

  'a description of the aspects of the environment likely to be significantly affected by the proposed development, including in particular … climatic factors';

- **Climate Action and Low Carbon Development (Amendment) Act 2021** (GOI 2021). The Climate Action and Low Carbon Development (Amendment) Act 2021 commits Ireland to 2030 and 2050 targets for reducing greenhouse gas (GHG) emissions and providing the governance framework. The country is now on a legally binding path to net-zero emissions no later than 2050, and to a 51% reduction in emissions by the end of this decade. Climate Action Plans will set out the measures to be taken to reach national climate targets in each sector of the economy. Section 5 of the Climate Action and Low Carbon Development (Amendment) Act 2021, provides for the introduction of additional gas-fired generation capacity as part of the overall reduction in emissions and transition to zero carbon economy.

- **Climate Action Plan 2024** (GOI 2023). This updated Plan provides a detailed plan to achieve a 51% reduction in GHG emissions by 2030 and achieve net zero emissions by no later than 2050. The plan also details the development of climate risk identification services and climate adaptation measures for specific sectors. The Climate Action Plan was published December 2023 and sets out of the roadmap for achieving Ireland's carbon budgets and reaching net zero by 2050. The carbon budgets, proposed by the Climate Change Advisory Council, were adopted 6th April 2022 and are outlined in **Table 15.1**. The Climate Action Plan acknowledges the need for efficient, conventional generation capacity to act as support or back-up to a renewables based system. Targets and actions set out in the Climate Action Plan include the delivery of c.2 GW of new flexible gas-fired power stations by 2030.

Table 15.1: Irish Carbon Budgets

	2021-2025	2026-2030	2031-2035
Carbon Budget (Mt CO_2e)	295	200	151

- **National Energy and Climate Plan 2021-2030** (Department of Communications, Climate Action and Environment, 2020a). The 2020 NECP incorporates all planned energy and climate policies and measures identified up to the end of 2019. The Plan has been created in part to support the EU's 2050 net zero target and strategy to develop an energy union to provide EU consumers secure, sustainable, competitive and affordable energy through the five dimensions. The five dimensions include:
  - Security, solidarity and trust.
  - A full integrated internal energy market.
  - Energy efficiency.
  - Climate action, decarbonising the economy.

  - Research, innovation and competitiveness.

  The Plan sets out in detail Ireland's strategy to meeting these five dimensions together with planned policies and measures to ensure that these objectives are achieved. This strategy acknowledges the increasing role of natural gas in the energy mix for heat, transport and power generation, including its role as a back up to intermittent power generation from renewable sources.

- **The White Paper: Ireland's Transition to a Low Carbon Energy Future 2015-2030.** (Department of Communications, Climate Action and Environment, 2020b). The White Paper considers Ireland's complete energy policy and European and International climate change objectives and agreements, as well as Irish social, economic and employment priorities. The paper confirms the need to enhance energy security and to provide a reliable supply of gas to meet demand as part of a sustainable energy transition to a low carbon future.

- **National Adaptation Framework** (GOI 2018a). Ireland's first national strategy '*to reduce the vulnerability of the country to the negative effects of climate change and to avail of the positive impacts'.*

- **National Planning Framework** (GOI 2018b). The National Planning Framework contains strategic level planning policy for guiding development and investment in Ireland over the coming two decades focusing on three key pillars (1) sustainability (2) security of supply, and (3) competitiveness. As such, it sets the strategic planning context for facilitating the proper planning and sustainable development of the country's regions and local communities, containing a set of national objectives and key principles by which more detailed and refined regional and local plans are informed. The overarching target for the energy sector is to reduce GHG emissions by at least 80% by 2050, compared to 1990 levels. This is predominately aimed be achieved through a shift from fossil fuels to renewable energy sources.

- **Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction.** Ireland's Long-term Strategy on Greenhouse Gas Emissions Reductions sets out indicative pathways, beyond 2030, towards achieving carbon neutrality for Ireland by 2050. The Strategy builds upon the decarbonisation pathways set by the carbon budgets, sectoral emissions ceilings and Climate Action Plan 2023, to ensure coherent and effective climate policy. It is underpinned by analysis of transition options across each key sector of the economy and provides a crucial link between Ireland's 2030 climate targets and the long-term goal set by Ireland's National Climate Objective and the European Climate Law. The Long-term Strategy covers, with a perspective of at least 30 years.

15.4.4 Gas and Electricity Transmission Network Rules and Path to Net Zero

- **The Integrated Single Electricity Market Rules.** EirGrid is part of the EirGrid Group who, through the Single Electricity Market Operator (SEMO), is responsible for the operation of the Single Electricity Market (SEM). SEM is the all-island wholesale electricity market. As the TSO, EirGrid plays a vital role in the operation of the SEM. EirGrid's electricity forecasts are used to ensure that there is sufficient generation capacity to meet electricity demand at all times of the day. The dispatch of the Power Plant will be controlled by SEMO.

Dispatch under the I-SEM is determined by economic merit as well as the requirements of the grid and EirGrid are obliged to dispatch based on economic merit. As all power production requires the producer to purchase the necessary emissions allowances under the ETS, the cost of emissions as per the ETS is reflected in the price of power and therefore in dispatch (i.e. plants which are less carbon efficient will have higher costs and be lower in the economic merit order). Plants are required under the balancing market principles code of practice to reflect the cost of carbon in their bidding prices which ensure the I-SEM arrangements reflect carbon efficiency as a part of the overall dispatch of plants (SEM Committee, 2017).

- **EirGrid. Tomorrow's Energy Scenarios 2019 Ireland - Planning our Energy Future.** Tomorrow's Energy Scenarios (TES) outlines possible future pathways for the electricity system. TES proposes two scenarios reaching the 70% RES-E target by 2030 as set out in the Government's Climate Action Plan, and one scenario reaches carbon neutrality in the electricity system by 2040. In order to achieve a carbon neutral electricity system, the provision of all capacity, energy and system services must be done without the net release of carbon dioxide emissions (net zero). TES requires new investment in natural gas fired generation capacity to replace forecasted closures.

- **EirGrid. Tomorrow's Energy Scenarios 2023 - Consultation Report** (TES 2023). The TES2023 report contains the latest thinking of long-term energy scenarios for Ireland and Northern Ireland and tracks how electricity demand and generation may evolve from 2035-2050.

- **GNI Energy Strategy – Path to Net Zero Energy Action Plan 2023.** GNI's Energy Strategy – Path to Net Zero is a roadmap for the gas network to evolve to become net zero carbon by 2050. In doing so it will support emissions reductions across every sector of the Irish economy at the lowest cost possible. GNI note the solution to Ireland's energy and climate challenge will require the successful deployment of many technologies. Electrification, natural gas (with Carbon Capture and Storage (CCS)), renewable gas and renewable electricity sources will all play significant roles in the energy system in 2050. GNI's Action Plan 2023 document outlines how net zero can be achieved by meeting half the projected 2050 gas demand with net zero carbon and zero carbon gases and by using Carbon Capture and Storage (CCS) to abate the emissions from the remaining natural gas. Gas Networks Ireland has already begun to invest in new technologies to facilitate renewable gas injection into the gas network, and to supply Compressed Natural Gas (CNG) from the gas network as a fuel source for commercial vehicles.

- **Electricity and Gas Networks Sector Climate Change Adaptation Plan.** The Irish Government's Department of the Environment, Climate and Communications (DECC) published a climate change action plan for energy networks in 2019, with the latest update occurring in January 2021 (DECC, 2021a). This plan focuses on identifying areas of vulnerability as a first step to minimising future adverse impacts and increasing building resilience within the sector.

- **Policy Statement on Security of Electricity Supply.** The Irish Government's DECC published this policy statement in November 2021 (DECC, 2021b) which outlines GHG reduction targets for the electricity sector, alongside a pathway to net zero emissions by 2050.

15.4.5 Regional and Local Guidance

- **Southern Region Waste Management Plan** (Southern Waste Region, 2015). The Proposed Development falls under this Plan that includes key targets in waste prevention.
- **Regional Spatial and Economic Strategy for the Southern Region** (Southern Regional Assembly, 2020). The Regional Spatial and Economic Strategy for the Southern Region contains the statutory, regional-level strategic planning policy for the counties of Kerry, Limerick, Clare, Cork, Tipperary, Waterford, Kilkenny, Carlow, and Wexford, and aligns with and is informed by the National Planning Framework. One of the Strategic Environmental Objectives (SEOs) guiding the strategy's Strategic Environmental Assessment (SEA) Statement relates to climate and is as follows:
  - *Achieving transition to a competitive, low carbon, climate-resilient economy that is cognisant of environmental impacts.*
  - *Reducing GHG emissions and integrating sustainable design solutions into the region's infrastructure are some of the climate-related Strategic Environmental Objectives for the region.*
- **KCC Climate Change Adaptation Strategy 2019-2024** (Kerry Co. Co., 2019). Formed under the National Adaptation Framework, this strategy details actions for the Council across themes of Local Adaptation Governance and Business Operations, Infrastructure and Built Environment, Land use and Development, Drainage and Flood Management, Natural Resources and Cultural Infrastructure, and Community Health and Wellbeing. Actions include promotion of measures to reduce GHG emissions through sustainable planning strategies, promoting sustainable modes of transport, renewable energy, climate-smart and near zero energy buildings, stipulating climate change requirements for urban storm water drainage systems.
- **KCC Climate Action Plan 2024-2029** (Kerry Co. Co., 2024). This plan outlines the ambition of KCC in climate action to meet its own emissions and energy efficiency targets. This includes a 51% reduction in GHG emissions and a 50% improvement in energy efficiency by 2030. Externally the Local Authority seeks to influence, advocate and facilitate climate action ambitions within the local community.
- **Kerry County Development Plan (CDP) 2022-2028** (Kerry Co. Co, 2022). The Kerry CDP forms an important part of the County's Climate Action Response. As part of this, the plan takes forward the three priority areas for action outlined in the Southern Regional RSES: - Decarbonisation, Resource efficiency and Climate resilience. The CDP is also mindful of the carbon emission reduction requirements set out in the Climate and Action and Low Carbon Development (Amendment) Act 2021. Of the environmental performance objectives, in relation to climate change and this application, it states:
  - *'Encourage the sustainable re-use of brownfield sites';*
  - *'Minimise greenhouse gas emissions to meet national and international standards';*
  - *'Promote the use of the full suite of Sustainable Urban Drainage Systems (SUDS)';*
  - *'Maintain and improve the quality of wastewater discharges'; and*

– *'Sustainably manage the abstraction of water'.*

15.5 Methodology

The methodologies presented in the following section have been developed in line with the relevant planning policy requirements and appropriate industry guidance for assessing GHGs and climate change resilience and adaptation.

15.5.1 Lifecycle GHG assessment

15.5.1.1 Study Area (Lifecycle GHG Assessment)

The GHG study area considers all direct GHG emissions that arise during the life of the Proposed Development including those from construction and operation activities within the red line boundary area. It also considers indirect emissions from activities onsite as well as upstream and downstream emissions, such as transport, waste disposal and embedded carbon in construction materials and products.

The scope and boundary for the assessment has been determined in line with the GHG Protocol Corporate Standard (WRI & WBCSD, 2015). Scope 1 emissions include direct GHG emissions from sources owned or operated by the company. Scope 2 emissions include indirect emissions generated offsite from purchased electricity and other imported services. Scope 3 emissions include any other indirect GHG emissions occurring from sources not owned or controlled by the company. The reasons for incorporating scope 3 emissions in GHG reporting include (WRI & WBCSD, 2015):

- They are large (or believed to be large) relative to the company's scope 1 and scope 2 emissions.
- They contribute to the company's GHG risk exposure.
- They are deemed critical by key stakeholders (e.g., feedback from customers, suppliers, investors, or civil society).
- There are potential emissions reductions that could be undertaken or influenced by the company.

15.5.1.2 Determining the Baseline (Lifecycle GHG Assessment)

The baseline for the GHG assessment considers a scenario where the Proposed Development does not proceed.

The baseline for construction emissions considers the current land use at the Site of the Proposed Development and the GHGs locked in carbon stocks above and below ground. It also considers any construction that may occur if the Proposed Development does not proceed.

The baseline for operational emissions considers forecast GHG emissions and GHG reduction targets for both Ireland as a whole and the electricity generation sector in Ireland.

15.5.1.3 Sensitive Receptors (Lifecycle GHG Assessment)

There is currently no published standard definition for receptor sensitivity of GHG emissions. All GHG emissions are classed as being capable of being significant on the basis that all emissions contribute to climate change (IEMA, 2022). The global climate has been identified as the receptor for the purposes of the GHG assessment. The sensitivity of the climate to GHG emissions is considered to be 'high'. The rationale supporting this includes:

- GHG emission impacts could compromise Ireland's ability to reduce its GHG emissions, in line with international and national future carbon targets.
- The need to reduce GHG emissions to reduce the risks and impacts of climate change, as broadly identified by the climate science community and by the Paris Agreement which aims to keep global temperature rise this century below two degrees above pre-industrial levels, (UNFCCC, 2016). Additionally, a recent report by the IPCC highlighted the importance of limiting global warming below 1.5°C (IPCC, 2018).
- A disruption to global climate is already having diverse and wide-ranging impacts on the environment, society, economic and natural resources. Known effects of climate change include increased frequency and duration of extreme weather events, temperature changes, rainfall and flooding, and sea level rise and ocean acidification. These effects are largely accepted to be negative, profound, global, likely, long-term to permanent, and are transboundary and cumulative from many global actions.

The effect of the Proposed Development on Ireland's national GHG inventory and carbon reduction targets will be used as a proxy to the global climate.

15.5.1.4 Approach (Lifecycle GHG Assessment)

In line with ISO14064 (2018a and b) and principles of the GHG Protocol (WRI & WBCSD, 2004), the GHG emissions have been calculated by multiplying activity data by its relevant emission factor:

Activity data x GHG emissions factor = GHG emissions in mass of CO_2e

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. Activity data has been sourced from the Applicant. Where specific data is not available, a mix of assumptions and industry benchmarks have been used to fill data gaps. Where this is not possible, then a qualitative approach to assessing the GHG impacts has been followed, in line with the IEMA guidance (2022).

Emission factors have been sourced from publicly available sources, including SEAI (2022), DESNZ (2023), and the Bath University ICE (2019). Carbon emissions and sinks through land use change have been calculated by using the European Commission's Guidelines for Land Carbon Stocks (2010).

In line with the ISO standard 14064 and the principles of the GHG Protocol (WRI & WBCSD, 2004) when calculating GHG emissions, the seven Kyoto Protocol GHGs have been considered, specifically:

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

These gases are broadly referred to in this report under an encompassing definition of 'GHGs', with the unit of tCO_2e (tonnes CO_2 equivalent) or $MtCO_2e$ (mega tonnes of CO_2 equivalent).

15.5.1.5 Well-to-tank (Indirect) Emissions

Well-to-tank emissions include those upstream emissions associated with the extraction, refining and transportation of the raw fuel source (Natural Gas (NG)) to the point of use. These are in addition to the direct emissions from the combustion of the fuel by the end user and are reported in Scope 3. For this study, well-to-tank emissions have been included for all NG that will be consumed within the Proposed Development. This approach is deemed reasonable as under the EU Emissions Trading System and the EU Effort Sharing Legislation (discussed in **Section 15.3**) it is the end user of the gas who is responsible for the direct and indirect emissions from the use of this fuel.

Table 15.2: Scope of GHG Emissions Assessment

Scope	Activity	Construction	Operations
Scope 1 (Direct GHG Emissions)	Fuel Usage Onsite	**Included in all phases. Fuel use by plant and machinery onsite (including** combustion **of gas for electricity generation by Power Plant and energy use in buildings)**	
	Company Vehicle Usage	Not included	
	Fugitive Emissions	N/A - none expected	**Included** within Scope 3 - Fuel and Energy-Related Activities
Scope 2 (Electricity Indirect GHG Emissions)	Electricity Purchased	**Included**	N/A - none expected (electricity loads are taken from that generated, not grid sourced with the exception of the BESS)
Scope 3 (Other Indirect Emissions-Upstream)	Purchased Goods and Services	**Included in all phases. Emissions associated with embodied carbon in** materials	
	Capital Goods	Not included - emissions are expected but not possible to calculate	
	Fuel and Energy-Related Activities (not included in Scope 1 or 2)	N/A - none expected	N/A - none expected
	Upstream Transportation and Distribution	**Included. Emissions associated with material and waste transport**	**Included. Emissions associated with material and waste transport, and tugs**
	Waste Generated in Operations	**Included in all phases. Emissions associated with treatment and disposal of wastes**	
	Business Travel	Not included	
	Employee Commuting	**Included in all phases**	
	Upstream Leased Assets	N/A - none expected	
Scope 3 (Other Indirect Emissions-Downstream)	Transportation and Distribution of Sold Products	N/A - none expected	N/A - none expected (grid operator activity)
	Processing of Sold Products	N/A - none expected	
	Use of Sold Products	N/A - none expected	Not included
	End-of-life Treatment of Sold Products	N/A - none expected	
	Downstream Leased Assets	N/A - none expected	
	Franchises	N/A - none expected	
	Investments	N/A - none expected	
Other	Carbon Displacements and Offsets	**Included in all phases**	
	Land Use Change	**Included in all phases**	

The IEMA (2022) guidance states that there are currently no agreed methods to evaluate levels of GHG significance and that professional judgement is required to contextualise the project's emission impacts. In GHG accounting, it is considered good practice to contextualise emissions against pre-determined carbon budgets (IEMA, 2022). In the absence of relevant Irish carbon budgets, the national GHG Inventory and carbon reduction targets can be used to contextualise the level of significance.

The construction emissions of the Proposed Development will be compared to the Irish inventory due to proximity in time. The projected operational GHG emissions in 2030 will then be contextualised against the 2030 carbon target. This is summarised in **Table 15.3**. As published by the Environmental Protection Agency (EPA) (2023) in the report on Ireland's Provisional GHG emissions 1990-2022, the total Irish emissions in 2022 have been estimated to be 60.76 Mt CO_2e. The Climate Action and Low Carbon Development (Amendment) Act 2021 requires Ireland to achieve a reduction of 51% against a 2018 baseline by 2030. This equates to total allowable emissions in 2030 of 29.86Mt CO_2e if the target is met.

Table 15.3: Magnitude Criteria for GHG Emissions

Magnitude of Impact	Magnitude Criteria Description
High	Estimated GHG emissions equate to equal to or more than 1% of the estimated Irish GHG Inventory in the year which they arise.
Low	Estimated GHG emissions equates to less than 1% of the estimated Irish GHG Inventory, or less than the Irish 2030 emissions budget.

This method to determine the significance of GHG emissions are summarised in **Table 15.4.**

Table 15.4: Significance of GHG Emissions

		Sensitivity of Receptor
Magnitude of GHG emissions (Table 15.3)	**High**	Major adverse significance.
	Low	Minor adverse significance.

15.5.2 In-Combination Climate Change Impacts

15.5.2.1 Study Area (ICCI assessment)

The study area for the ICCI assessment is specific to the risk identified and is determined by the relevant Environmental Discipline assessment as presented in this EIAR. For example, if an ICCI risk is identified by the Air Quality team (*i.e.* increased dust production due to drier conditions), the study area will be that as defined within the Air Quality Chapter.

15.5.2.2 Determining the Baseline (ICCI Assessment)

For the purposes of the ICCI assessment, the baseline conditions are based upon historic climate change data obtained from Met Éireann recorded by the closest meteorological station to the Proposed Development (Shannon Airport, approximately 20 km north-east of the Site).

15.5.2.3 Sensitive Receptor (ICCI Assessment)

The sensitive receptors for the ICCI assessment are those determined in of each of the Environmental Discipline assessments presented in this EIAR.

15.5.2.4 Approach (ICCI Assessment)

The ICCI assessment considers the ways in which projected climate change will influence the likelihood and severity of the impact of the Proposed Development on receptors in the surrounding environment. The scope of the ICCI assessment is detailed in **Table 15.5.**

The ICCI assessment considers the existing and projected future climate conditions for the geographical location and assessment timeframe. It identifies the extent to which identified sensitive receptors in the surrounding environment are potentially vulnerable to and affected by these factors. The receptors for the ICCI assessment are those that will be impacted by the Proposed Development as identified within the wider EIAR. These impacts are assessed in liaison with the technical specialists responsible for preparing other technical chapters of this EIAR.

Table 15.5: Scope of ICCI Assessment

Climate Hazard	Scoped In or Out	Decision Rationale
Storm event	In	An increase in the likelihood and severity of extreme storm events could lead to damage to ecosystem stability. In combination with sea level rise, the likelihood and severity of acute coastal impacts such as erosion, loss of habitats, destabilisation and damage to infrastructure via increased storm surges. These impacts may be exacerbated by the Proposed Development.
Precipitation change (rainfall patterns)	In	Climate change is projected to affect the distribution of rainfall throughout the year with and increase in winter precipitation and a reduction in summer precipitation.
Precipitation change (flooding)	In	Climate change may lead to an increase in substantial precipitation events. Increasing the risk of flooding for the Proposed Development.
Precipitation change (droughts)	In	The combination of the Proposed Development and its water requirements and climate change may cause increased risk of impacts.
Temperature	In	Fluctuating levels of temperature may lead to: Increase in likelihood and severity of heat waves which might have a negative impact on biodiversity and health. Increase in likelihood and severity of freezes which might have a negative impact on biodiversity and health.
Sea level rise	In	The Site is located in an area that is susceptible to sea level rise. The impacts of sea level rise on receptors may be exacerbated by the Proposed Development.
Sea temperature	In	The Proposed Development will produce thermal discharges which may be directed to sea via the outfall. The combination of this with increasing sea temperatures may cause increased risks to marine ecology and the physico-chemical environment.
Wind	Out	The Proposed Development is not expected to alter the wind environment and therefore to not have any additional impact upon receptors identified by other environmental disciplines.

An assessment of ICCI has been conducted for the Proposed Development to identify potential climate change impacts and considers their potential consequence and likelihood of occurrence.

The likelihood of an in-combination impact occurring (a change in the impact significance level to surrounding receptors when the impacts from the Proposed Development have been considered in-combination with climate change) has been determined based on the assessed likelihood of a climate hazard occurring, combined with the sensitivity of the receptor as defined by the relevant environmental disciplines, using professional judgement.

Information on historic observations on climate change, such as carried out by Met Éireann, along with climate change projection data from the Climate Ireland (2022), have been used to identify potential chronic and acute climate hazards that may affect the geographical location of the Proposed Development.

The likelihood of each potential climate change hazard occurring has then been assessed. Likelihood is categorised into four levels depending on the probability of the hazard occurring. **Table 15.6** presents the likelihood levels and definitions used. This is in line with the definitions presented in the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (IPCC, 2021). There is some amount of overlap in the criteria provided to allow for uncertainty and the qualitative approach of the assessment.

Table 15.6: ICCI Assessment - Level of Likelihood of the Climate Hazard Occurring

Level of Likelihood	Definition of Likelihood
Very likely	90-100% probability that the hazard will occur.
Likely	66-90% probability that the hazard will occur.
Possible, about as likely as not	33-66% probability that the hazard will occur.
Unlikely	0-33% probability that the hazard will occur.

The likelihood of an impact occurring is then determined using the relevant discipline lead's understanding of the receptor sensitivity to the climate hazard. In defining the likelihood of an in-combination climate impact occurring, embedded and good practice mitigation measures (primary and tertiary mitigation) are taken into consideration. Definitions of likelihood are set out in **Table 15.7.**

Table 15.7: ICCI Assessment – Level of Likelihood of the Climate Impact Occurring

Level of likelihood of climate impact occurring	Definition of likelihood
Likely	66-100% probability that the impact will occur during the life of the project.
Possible, about as likely as not	33-66% probability that the impact will occur during the life of the project.
Unlikely	0-33% probability that the impact will occur during the life of the project.

Table 15.8 is then used to determine the overall likelihood of the ICCI. Once the likelihood of an in-combination climate impact occurring on a receptor has been identified, the discrete environmental assessment should consider how this will affect the significance of the identified effects.

Table 15.8: Level of Likelihood of the ICCI

		Likelihood of climate change hazard occurring (Table 15.7)				
		Very Unlikely	**Unlikely**	**Possible**	**Likely**	**Very likely**
Likelihood of impact occurring (given embedded mitigation measures, Table 15.6)	**Unlikely**	Low	Low	Low	Medium	Medium
	Possible	Low	Low	Medium	Medium	Medium
	Likely	Low	Medium	Medium	High	High

The ICCI consequence criteria are defined in **Table 15.9** and are based on the change to the significance of the effect already identified by the environmental discipline. To assess the consequence of an ICCI impact, each discipline has assigned a level of consequence to an impact based on the criteria description in **Table 15.9** and their discipline assessment methodology.

Table 15.9: ICCI assessment – Consequence Criteria

Consequence	Consequence criteria
High	The climate change parameter in-combination with the effect of the Proposed Development causes the significance of the effect of the proposed scheme on the resource / receptor, as defined by the topic, to increase from negligible, minor or moderate to major.
Medium	The climate change parameter in-combination with the effect of the Proposed Development causes the effect defined by the topic, to increase from negligible or minor to moderate.
Low	The climate change parameter in-combination with the effect of the Proposed Development, causes the significance of effect defined by the topic, to increase from negligible to minor.
Very Low	The climate change parameter in-combination with the effect of the Proposed Development does not alter the significance of the effect defined by the topic.

The significance of potential effects is determined by the environmental disciplines using the matrix in **Table 15.10.** As a general rule, where an effect has been identified as moderate or major, this has been deemed significant. However, professional judgement is also applied where appropriate.

Table 15.10: ICCI Assessment – Significance Criteria

		Likelihood of the ICCI Occurring (Table 15.8)		
		Low	**Medium**	**High**
Consequence of ICCI Occurring (**Table 15.9**)	**Very Low**	Negligible	Negligible	Minor
	Low	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	High	Moderate	Major	Major

Where an ICCI is determined to be significant, then appropriate additional mitigation measures (secondary mitigation) are identified. Professional judgement is used to describe whether, with additional mitigation in place, the ICCI remains significant or the residual effect has been reduced to not significant. Where relevant, mitigation measures or mechanisms to reduce the potential significant effects arising from ICCI have been developed in discussion with environmental specialists.

15.5.3 Climate Change Resilience

15.5.3.1 Study Area (CCR Assessment)

The study area for the CCR assessment is the Site of the Proposed Development *i.e.* it covers all assets and infrastructure which constitute the Proposed Development, during construction and operation (including maintenance).

15.5.3.2 Determining the Baseline (CCR Assessment)

For the purposes of the CCR assessment, the baseline conditions are based upon historic climate change data obtained from Met Éireann recorded by the closest meteorological station to the Proposed Development (Shannon Airport, approximately 20 km north-east of the Site).

15.5.3.3 Sensitive Receptor (CCR Assessment)

The sensitive receptors for the CCR assessment include the Proposed Development during its lifetime. Receptors include both the building and operation of the assets as well as construction works and staff.

15.5.3.4 Approach (CCR Assessment)

The CCR assessment has considered the strategic aims and objectives encompassed within the Government's local planning strategy and policy, which has the overarching aim of minimising the adverse impacts of climate change, whilst requiring new developments to take climate change considerations into account within design. This assessment of CCR is undertaken for the Proposed Development to identify potential climate change impacts, and to consider their potential consequence and likelihood of occurrence, taking account of the measures incorporated into the design of the Proposed Development.

For the operational phase of the Proposed Development, potential climate change impacts have been identified using relevant projections and conclusions from Climate Ireland (2022) and considers their potential consequence to receptors and likelihood of occurrence, taking account of the measures incorporated into the design of the Proposed Development. Operational phase receptors may include the Proposed Development assets and their operation, maintenance and refurbishment (i.e. pavements, structures, earthworks and drainage, technology assets, etc.); and end-users (i.e. staff and commercial operators etc.).

For this CCR assessment, two climate change scenarios were reviewed to 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. These climate change projections were based on RCP 4.5 and RCP 8.5.

RCP 4.5 is an intermediate scenario and represents a less steep decline in GHG emissions than the targets in RCP 2.6. It requires that CO_2 emissions start declining by approximately 2045 to reach half of the levels by 2050 and decline to about 75% of the CH_4 levels of 2040. It also requires that SO_2 emissions decline to approximately 20% of those of 1980-1990.

RCP 8.5 was also used as it represents a worst-case scenario, which is useful in risk and contingency planning. This pathway has the highest emissions concentration and is marked by inadequate policy response and increased potential for physical asset damage.

The potential climate change impacts identified in the CCR assessment are determined based on the EPA projections available via Climate Ireland. Climatic parameters that will be included in the CCR assessment are detailed in **Section 15.6.2**. The scope of the CCR assessment is set out in **Table 15.11.**

Table 15.11: Scope of the CCR Assessment

Climate Hazard	Scoped In or Out	Decision Rationale
Storm Event	In	The Proposed Development may be vulnerable to extreme storm events resulting in storm damage, coastal erosion and storm surge to structures and assets.
Precipitation (floods)	In	The Proposed Development may be vulnerable to reduction in precipitation with pressure on water supply during extended periods of reduced rainfall.
Precipitation (droughts)	In	The Proposed Development may be vulnerable to damage to structures and drainage systems during periods of heavy precipitation.
Temperature	In	Increased temperatures may increase cooling requirements of the proposed scheme and could impact on structural integrity of buildings and materials.
Sea level rise	In	The site is located in an area that is susceptible to sea level rise.
Sea temperature	Out	The Proposed Development is not likely to be affected by the small increase in sea temperature during its operational life.

Climate Hazard	Scoped In or Out	Decision Rationale
Wind	In	The Proposed Development may be affected my increases in wind.

The approach outlined below is aligned with existing guidance such as that of IEMA (IEMA, 2020) and EU Technical Guidance on Climate Proofing Infrastructure (European Commission, 2021b). The CCR assessment identifies potential climate change impacts and considers their potential consequence to receptors and likelihood of occurrence.

The following key terms and definitions relating to the CCR assessment have been used (IPCC, 2021):

- Climate hazard – a weather or climate related event, which has potential to do harm to environmental or community receptors or assets, for example, increased winter precipitation.
- Climate change impact – an impact from a climate hazard which affects the ability of the receptor or asset to maintain its function or purpose.
- Consequence – any effect on the receptor or asset resulting from the climate hazard having an impact.

The types of receptors considered vulnerable to climate change, are:

- Construction phase receptors (*i.e*. workforce, plant and machinery).
- The Proposed Development assets and their operation, maintenance and refurbishment (*i.e.* pavements, structures, earthworks and drainage, technology assets, etc.).
- End-users (*i.e.* staff and commercial operators etc.).

The assessment includes all infrastructure and assets associated with the Proposed Development. It assesses the resilience against both gradual climate change and the risks associated with an increased frequency of severe weather events as per the Climate Ireland projections.

For the operational phase of the Proposed Development, once potential impacts have been identified, the likelihood and consequence of each impact occurring to each receptor (where relevant) are assessed for the selected future time frame and climate change scenario for operation. Climate Ireland only provides projections for the time period of 2041-2060, as the operation of the Proposed Development will occur largely in this period this was deemed suitable for the assessment of climate risks. Criteria used to determine the likelihood of an event occurring, based on its probability and frequency of occurrence, are detailed in **Table 15.12**, as adapted from IEMA guidance (IEMA, 2020).

Table 15.12: Description of Likelihood for Climate Change Hazard

Likelihood Category	Description (probability and frequency of occurrence)
Very likely	90-100% probability that the hazard will occur.
Likely	66-90% probability that the hazard will occur.
Possible, about as likely as not	33-66% probability that the hazard will occur.
Unlikely	0-33% probability that the hazard will occur.
Very unlikely	0-10% probability that the hazard will occur.

***The event is defined as the climate event (such as heatwave) and the hazard (such as overheated electrical equipment) occurring in combination*

The consequence of an impact has been measured using the criteria detailed in **Table 15.13.**

Table 15.13: Measure of Consequence for CCR

Consequence of Impact	Description
Very high	Permanent damage to structures / assets. Complete loss of operation / service. Complete / partial renewal of infrastructure. Serious health effects, possible loss of life. Extreme financial impact. Exceptional environmental damage.
High	Extensive infrastructure damage and complete loss of service. Some infrastructure renewal. Major health impacts. Major financial loss. Considerable environmental impacts.
Medium	Partial infrastructure damage and some loss of service. Moderate financial impact. Adverse effects on health. Adverse impact on the environment.
Low	Localised infrastructure disruption and minor loss of service. No permanent damage, minor restoration work required. Small financial losses and / or slight adverse health or environmental effects.
Very low	No damage to infrastructure. No impacts on health or the environment. No adverse financial impact.

Engagement is undertaken with relevant environmental disciplines and the engineering design team to discuss the CCR assessment and identify mitigation measures for incorporation into the design of the Proposed Development. Measures to adapt the Proposed Development are identified where potential climate change consequences are identified as being significant and would be reported in the EIAR.

The significance is determined by:

Likelihood of climate hazard occurring × consequence to receptor if climate hazard occurs.

The identification of likely significant effects on receptors has been undertaken using professional judgement by combining the measure of likelihood with the predicted consequence of impact, as shown in **Table 15.14.**

Table 15.14: Significance Criteria for CCR Resilience Assessment

		Likelihood of the climate change hazard occurring (Table 15.12)				
		Very unlikely	**Unlikely**	**Possible**	**Likely**	**Very likely**
Consequence of Climate Change Hazard Occurring (Table 15.13)	**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)
	Very High	Negligible (NS)	Minor (NS)	Moderate (S)	Major (S)	Major (S)

S – Significant; NS – Not Significant

The assessment of potential impacts and the Proposed Development's vulnerability takes into account the mitigation measures that have been designed into the Proposed Development, as discussed in **Section 15.9**.

The assessment also identifies and accounts for existing CCR measures either already in place or in development for infrastructure and assets, for example, mitigation measures for potential flooding impacts on the Proposed Development

15.5.4 Limitations and Assumptions

As detailed design has not been completed, some data are not available to allow for a fully quantified assessment of the GHG emissions from the construction and operation of the Proposed Development. Accordingly, appropriate industry estimates and averages have been used. These, and all other assumptions are detailed in **Section 15.8.1.1** and **15.8.1.2**.

A quantitative assessment of cumulative GHG effects is not possible as the identified receptor is the global climate and effects are therefore not geographically constrained. As stated by IEMA guidance (IEMA, 2022) effects of GHG emissions from specific cumulative projects in general should not be individually assessed, as there is no basis for selecting any particular (or multiple) cumulative project over any other. Consequently, consideration of the effects of the Proposed Development together with other developments on GHG emissions is not considered to be applicable.

Limitations associated with the approach taken for the CCR review relate to uncertainties inherent within Irish climate projections (Climate Ireland, 2022). By its very nature, climate change is associated with a range of assumptions and limitations. To overcome these, current climate change data and science have been incorporated into the assessment and proven effective approaches undertaken to assess similar project types have been replicated.

15.6 Baseline Environment

15.6.1 Greenhouse Gas Emissions

As discussed in **Section 15.5.1**, the baseline environment assesses the 'Do Nothing' scenario where the Proposed Development does not go ahead.

15.6.1.1 Construction Emissions Baseline

The baseline for construction emissions considers the current land use at the Site and the GHGs locked in carbon stocks above and below ground. The application Site boundary (red line) encloses an area of approximately 41 ha and is entirely owned by the Applicant. The Site is in pasture, comprising primarily improved grassland with some wet grassland adjacent to the Shannon Estuary. GHG stored in terrestrial carbon stocks at the Site is estimated to be 4,018 tCO_2e.

No other construction activities are planned at the Site therefore baseline emissions from construction are nil.

15.6.1.2 Operational Emissions Baseline

The baseline for operational emissions considers forecast GHG emissions associated with Ireland meeting future energy demands. Natural gas currently meets over 30% of Ireland's energy needs including heat and power for homes and businesses as well as for the generation of electricity. Supply of natural gas is currently

met through a combination of domestic production and imports via a pipeline from Scotland. In 2019, 53% of Ireland's natural gas was imported from the UK. This is forecast to rise to around 90% by 2030, which has implications for the security of Ireland's gas supply.

The Climate Action Plan (2024) sets out GHG emissions targets to 2030 for the five sectors that contribute most to Ireland's emissions: Agriculture, Transport, Electricity, Built environment and Industry. Electricity Sector targets presented in the plan include:

- To meet the required level of emissions reduction by 2030, Ireland will need to reduce annual CO_2e emissions from the electricity generation sector by 50% from 8 Mt CO_2e in the first carbon budget period (2021 – 2025) to 4 Mt CO_2e in the second carbon budget period (2026 – 2030).
- Achieving 80% of electricity demand from renewable sources (largely through onshore wind and solar energy generation, with support from offshore wind).
- Accelerate grid flexibility by improving system services through the increase of the maximum level of renewables at any one time on the grid, minimising surplus generation, and increasing storage capacity.
- Manage electricity demand and achieve zero carbon demand growth.

If these electricity sector targets are met, emissions from the electricity sector in 2030 will be 4 Mt CO_2e compared to 10.3 Mt CO_2e in 2018. The plan also highlights that the electricity sector meeting this target will be critical if the other sectors are to also meet their reduction targets. Specifically, Section 12 of CAP24 notes:

> *In 2022, renewable generation accounted for 38.6% of electricity, an increase from 35% in 2021. Electricity emissions decreased by 2% in 2022 which is attributable to an increase in renewable generation, coupled with reductions in coal, fuel oil, and peat use for electricity generation. Following a decrease of 8.9% in natural gas use in 2021, there was an increase of 12.6% year-on-year in 2022. According to the Sustainable Energy Authority of Ireland (SEAI), Ireland's electricity emissions in the first half of 2023 were 16.7% lower than for the same period in 2022. In the first half of 2023, renewables accounted for 43% of electricity generated, an increase of 0.9 percentage points on the first half of the previous year.*
>
> *The electricity sector continues to face an immense challenge in meeting its requirements under the sectoral emissions ceiling, as the decarbonisation of other sectors, including transport, heating, and industry, relies to a significant degree on electrification. The deployment rates of renewable energy and grid infrastructure required to meet the carbon budget programme for electricity is unprecedented and requires urgent action across all actors to align with the national targets.*

Key Targets

National Target	***2025***	***2030***
Renewable Electricity Share	*50%*	*80%*
Onshore Wind	*6 GW*	*9 GW*
Solar	*Up to 5 GW*	*8 GW*
Offshore Wind - At least	*-*	*At Least 5 GW*
New Flexible Gas Plant	*-*	*At Least 2 GW*
Demand Side Flexibility	*15-20%*	*20-30%*

Measures and Actions

Transformational policies, measures and actions, and societal change are required to increase the deployment of renewable energy generation, strengthen the electricity grid, and meet the demand and flexibility needs required for the challenges of:

- *Increasing renewable generation to supply 80% of demand by 2030 through the accelerated expansion of onshore wind and solar energy generation.*
- *Developing offshore renewable generation and delivering additional grid infrastructure.*
- *Developing micro- and small-scale generation, as well as community projects, through actions such as grant funding and enabling small-scale production to participate in energy markets.*
- *Transforming the flexibility of the electricity system by improving system services and increasing storage capacity.*
- *Developing tools and mechanisms that support demand side flexibility services which leverage smart metering, including market incentives and smart tariffs, reducing / removing regulatory barriers, and focusing on flexibility-ready standards for smart technology.*
- *Delivery of at least 2 GWs of new flexible gas-fired generation.*

It is further noted in the NECP (page 48) that 'The generation of electricity using peat and coal is being phased out. This generation will be replaced by a combination of renewable energy, interconnection imports and in the short to medium term by generation from natural gas.'

In its approach to tackling climate change, the EU has split GHG emissions into two categories: those captured by the EU ETS (the traded sector) and the remainder that are not subject to the EU ETS (the non-traded sector). Emissions from electricity generation and large industry are in the traded sector and are dealt with at the EU level. The EU ETS includes more than 11,000 power stations and industrial plants (stationary installations) in 31 countries. It covers about 45% of EU emissions, but only about 29% of total emissions in Ireland. The overwhelming majority of the direct (Scope 1) emissions resulting from the Proposed Development would likely be captured by the EU ETS.

To provide additional context, it is assumed that operational emissions from the Proposed Development can be compared to emissions from an open cycle gas turbine (OCGT) generating an equivalent amount of energy. The lower operating efficiency of an OCGT means that it would have significantly higher direct operational emissions than the combined cycle gas turbine plant (CCGT) that forms part of the Proposed Development.

As discussed in **Section 15.4**, there are a number of European and Irish policies and initiatives designed to reduce emissions over time, with the European Green Deal aiming to make Europe GHG neutral by 2050. A key pillar of the Green Deal requires the decarbonising of energy systems. Within Ireland, the Climate Action Plan 2024 also seeks to achieve net-zero emissions by 2050. Finally, the Climate Action and Low Carbon Development (Amendment) Act 2021 commits Ireland to move to a climate resilient and climate neutral economy by 2050. Achieving net-zero emissions or carbon neutrality requires that residual emissions remaining by the target date must be removed from the atmosphere or otherwise offset using a scheme recognised and verified to an approved standard.

In light of the above legislative framework, the path to decarbonise Ireland's gas and electricity systems is described by the Transmission System Operators for electricity and gas in the following three documents:

- EirGrid's *Tomorrow's Energy Scenarios* (TES) *2019 Ireland - Planning our Energy Future* (EirGrid Group, 2019).
- EirGrid's *Tomorrow's Energy Scenarios 2023 Consultation Report* (TES 2023).
- GNI's *Vision 2050*. (GNI, 2019).

EirGrid's TES sets out three credible scenarios for how the power system may be transformed over the period to 2040, with each scenario discussing the contributions of initiatives including the phase out of coal- and peat-fired generation, the role of carbon capture and storage, buildings energy efficiency, decentralisation and microgeneration, the role of smart meters and demand-side management among others.

GNI's Vision 2050 document describes how the Irish gas network will evolve to become net-zero carbon by 2050. This ambition is set to be achieved by two core methods:

- The injection of 50% zero and net-zero carbon gas (such as biomethane and green hydrogen) into the network to displace half the natural gas required to meet customer demand.
- The use of carbon capture and storage technology to abate the remaining emissions from the consumption of gas in the power generation sector and by large industry.

Each of these methods is anticipated to contribute approximately half the emissions reductions required to decarbonise the gas network.

15.6.2 ICCI and Climate Change Resilience

The current baseline for the CCR review is based on historic climate data obtained from Met Éireann (2020) recorded by the closest meteorological station to the Proposed Development (Shannon Airport, approximately 20 km north-east of the Site) for the period 1981-2000. These data are listed in **Table 15.15.**

Table 15.15: Historic Climate Data

Climatic Variable	Month	Value
Mean annual maximum daily temperature (°C)	-	14.0
Mean summer maximum daily temperature (°C)	-	19.3
Mean winter minimum daily temperature (°C)	-	3.5
Mean annual rainfall levels (mm)	-	985.3
Mean summer rainfall (mm)	-	214.8
Mean winter rainfall (mm)	-	299.9
Months with lowest average number of days with less than 0.2 mm of rainfall (days)	June	15
Month with greatest number of days with gales (days)	January	1.7

The future baseline will be used to determine the likely future climate change impacts on the Proposed Development and where potential climate adaption measures are required. The EPA (EPA, 2015) in the regional climate model projections for Ireland presents the following climate change projections for mid-century (2041-2060), against a baseline period of 1981-2000 (**Table 15.16**). Sea level rise projections were

obtained from the NASA Sea Level Projection Tool, and represent the total sea level rise at 2050 in Dublin (closest available data point).

Table 15.16: Future Baseline Climate Projections

Climate Variable	Baseline (1981-2000)	Climate Change Projection RCP4.5 (2041-2060)	Climate Change Projection RCP8.5 (2041-2060)	Projected Change in Likelihood
Temperature				
Mean annual maximum daily temperature (°C)	**14.0**	+1.1 (15.1)	+1.4 (15.4)	↑
Mean annual minimum daily temperature (°C)	**7.4**	+1.1 (8.5)	+1.4 (8.8)	↑
Mean summer maximum daily temperature (°C)	**19.3**	+1.2 (20.5)	+1.6 (20.9)	↑
Mean winter minimum daily temperature (°C)	**3.5**	+0.9 (4.4)	+1.3 (4.8)	↑
Number of frost days per annum	**16.7**	-52.3% (8.0)	-63.8% (6.0)	↓
Number of heatwaves per annum	**2**	3.9	6.2	↑
Highest temperature for baseline period (°C)	**30.6**	-	-	
Lowest temperature for baseline period (°C)	**-8.2**	-	-	
Rainfall				
Mean annual rainfall (mm)	**985.3**	-1.5% (970.5)	-1.0% (975.4)	↓
Mean summer rainfall (mm)	**214.8**	-3.7% (206.9)	-8.3% (197.0)	↓
Mean winter rainfall (mm)	**278.9**	-0.4% (277.8)	+2.1% (284.8)	↕
Wettest month on average (mm)	**December (110.3)**			
Driest month on average (mm)	**April (57.4)**			
Wet days >20mm (days per annum)	**4.2**	+12.5% (4.7)	+21.8% (5.1)	↑
Very wet days >30mm (days per annum)	**0.75**	+20.7% (0.9)	+29.9% (1.0)	↑
Highest daily rainfall (mm) for baseline period	**44.3**			
Other				
Sea level rise (m) (2050)		0.21	0.23	
Snowfall		-61%	-67.8%	↓
Potential Evapotranspiration (mm)	**1.6**	+2.7% (1.64)	+2.8% (1.65)	↑
Mean wind speed (knots)	**9.23**	-2.3% (9.01)	-2.8% (8.97)	↓
Storms	The number of very intense storms is projected to increase over the North Atlantic region in the future (2041-2060), under			

Climate Variable	Baseline (1981-2000)	Climate Change Projection RCP4.5 (2041-2060)	Climate Change Projection RCP8.5 (2041-2060)	Projected Change in Likelihood
	RCP8.5, projections suggest that the winter tack of these storms may extend further south and over Ireland more often. Under RCP4.5, the projects are similar, though with a weaker signal.			

Kerry's Climate Change Adaptation Strategy (Kerry Co. Co., 2019) states that it is located within the 'Atlantic Seaboard South Climate Action Region' and that this region is one of the most climate-susceptible regions in Ireland due to its exposure to wind and storms. Recent climate hazards experienced by the County include extreme rainfall and strong winds, heatwaves and droughts. Climate change-induced changes to these variables and their assumed likelihood of occurrence are summarised in **Table 15.17.**

Table 15.17: Summary of Future Climatic Projections

Climate Variable	Trend Direction	2041-2060 Likelihood
Temperature		
Average annual temperature	↑	Likely
Average summer temperature	↑	Likely
Average winter temperature	↑	Likely
Rainfall		
Annual rainfall	↓	Likely
Average summer rainfall	↓	Likely
Average winter rainfall	↔	Possible
Extreme Events		
Heat waves	↑	Possible
Droughts	↑	Likely
Storms- frequency	↑	Likely
Storms- intensity	↑	Likely
Sea Level		
Sea level rise	↑	Very likely
↑ - *Increasing,* ↓ - *Decreasing,* ↔ - *No Discernible Trend*		

15.7 Embedded Mitigation

15.7.1 Lifecycle GHG Impact Mitigation

To reduce carbon emissions during the construction and operation phase, embedded controls and mitigation measures as outlined in **Chapter 02** (Description of the Proposed Development) include:

- Existing tree protection measures during construction shall be carried out in accordance with BS 5837:2012, with a 5-10 m buffer of retained vegetation along the stream.
- The Power Plant offers very low minimum stable generation compared to other generators. This will allow the system operator to turn other less efficient generators off while keeping the Power Plant running at minimum generation to ensure grid stability during periods of high wind generation.

- The Power Plant shall not operate in less efficient Open Cycle mode.
- A closed loop air cooled steam condenser shall be used for the Power Plant. This will result in significantly less water being consumed for operation when compared to other possible cooling options.
- The Site layout is compact and efficient resulting in a smaller area being developed and therefore reduced release of carbon from terrestrial stocks such as soil and vegetation.
- The main site platform is at +18 m OD resulting in minimised cut and fill and therefore minimised terrestrial carbon stocks being released.
- Diesel Firewater Pump is operated in emergency conditions only, and apart from periodic testing is not run during normal operations.
- Black-start Diesel Generator used for initial start-up only and apart from testing would not be running during normal operations.
- Auxiliary Boiler is only operated when all CTG / HRSG Trains are not in operation to facilitate a unit start.
- Other design alternatives were considered (refer to **Chapter 03** (Need and Consideration of Alternatives)) which would have had higher CO_2 footprint.

15.7.2 In-Combination Climate Change Impacts Mitigation

Full details of the embedded design measures that reduce likelihood or severity of climate change hazards exacerbating operational impacts are detailed within other discipline assessments.

15.7.3 Climate Change Resilience Mitigation

Full details of embedded design measures that reduce the vulnerability of the Proposed Development are detailed within other technical disciplines. A summary of these measures includes:

- Electrical connections would be buried underground, insulating against overheating in times of heatwaves.
- The Proposed Development would be designed with any specific drainage terms and conditions of the IE Licence, as determined by the EPA, and associated planning conditions, to protect against high rainfall events or sea level rise.
- Drainage will be designed in line with the principles of SUDS for a 1 in 100-year flood event plus an uplift of 20% contingency to account for any influence of climate change.
- Use of attenuation ponds to hold peak discharges from storm events to reduce flash flooding onsite. These would be built in accordance with the SuDS manual and designed for a 1 in 100-year event plus a 20% allowance for climate change.
- The Power Plant is designed to operate over a large range of ambient conditions and the plant efficiency difference is less than 1% from high to low. Temperature changes would not have a noticeable impact. The efficiency impact would also be less when the plant is operating at lower loads.

- The Power Plant utilises air cooled heat exchangers rather than use of cooling water to reduce water demand.
- Finished floor level of the Substation to be constructed at the 0.1% AEP level plus a freeboard allowance of 600 mm. Finished floor level of the remainder of the facility to be constructed at the 1% AEP level plus a freeboard allowances of 600 mm.

15.8 Assessment of Impact and Effect

15.8.1 Lifecycle GHG Assessment

This section presents the impacts and effects associated with the construction and operation of the Proposed Development. The assessments have been undertaken with consideration of the mitigation measures outlined in **Section 15.5**. While the operation of the Proposed Development results in direct GHG emissions it is necessary to consider these impacts in the context of Ireland's objectives to decarbonise energy and the security of energy supply. As stated in **Section 15.4.3**, The National Energy and Climate Plan 2021-2030 (Draft update 2023) recognises that that if Ireland is to meet its ambitious renewable energy target of 80% by 2030, then natural gas has a key role to play in providing a contribution to the energy mix for heat and transportation, and supporting the transition to renewable power generation.

Furthermore, the use of a CCGT as planned for the Proposed Development provides an efficient source of gas-powered energy generations. For further context emissions from the Proposed Development have been compared against the impact of generating an equivalent amount of energy from a typical Open Cycle Gas Turbine (OCGT) such as those currently supplying electricity to the electricity grid.

15.8.1.1 Construction Phase Emissions

The assessment of GHG emissions has been undertaken based on the following conditions using a mixture of existing project data and information, industry benchmarks and professional judgement. The following assumptions, inclusions and exclusions, made on a precautionary basis, have been used in this calculation.

- Construction activities would take 32 months for the Proposed Development, with activities undertaken Monday to Saturday.
- The peak number of workers on-site has been estimated as 1070 per day (as described in **Chapter 11** (Traffic and Transport)). To increase conservatism, it is assumed that there will be 1,070 workers on-site each of day construction.
- Fuel usage onsite has been based on the list of construction equipment provided by the Applicant, which has been assumed to be in operation 70% of the time.
- Electricity usage likely needed for onsite welfare and offices has been included but is based upon industry benchmarks described in Chartered Institution of Building Services Engineers (CIBSE) (2008). As the size of these facilities is not available an estimation of 2.3 m^2 per person has been applied to a 'general office' benchmark, for the peak amount of workers onsite being 1070from the construction manpower projection in the Proposed Development description.
- Purchased goods and services include potable water and some building materials. As a bill of quantities for construction materials is not yet available, estimated embodied carbon has been calculated using the Proposed Development buildings floor area (13.2 ha) against the single point benchmark under other industrial / utilities / specialist users developed by RICS (2014). This is a

partial estimate based on assumptions of building dimensions, and excludes fit-out materials, and any explosives required. The embodied carbon of the Battery Energy Storage System (BESS) (27 lithium-ion batteries, with a capacity of 4.5 MWh each) has been included.

- Water requirements for the construction phase (e.g. wheel washing and dust suppression) have been included as up to 55 m^3 per day, as per **Chapter 06** (Water).
- Construction transport emissions are based on construction vehicle movement projections (in **Chapter 02** (Description of the Proposed Development), assumed to be travelling 25 km each way based on the distance from the Port of Foynes:
  - 40 heavy goods vehicles (HGVs) per day.
  - 80 LGVs per day.
- Transportation of the lithium-ion batteries has also been included, based on a worst-case sea transportation from Asia and HGV transport at the source location and within Ireland.
- Construction waste quantities have been taken from **Chapter 16** (Waste Management). They have been determined from an average based on the floor area of the Site being 13.2 ha (Post-development surfacing quantities) and approximately 475,000 m^3 excavated and placed overburden soil and rock. Waste quantities are based on percentages for 'good practice recovery' from the waste management practices outlined by the Applicant.
- Municipal waste volumes have been calculated using Ireland's total waste data for 2018 per person, with 81% being recycled or incinerated and 19% going to landfill (EPA, 2018). This has been applied to the total 360,960 worker days for the entire construction period.
- Employee transport emissions have been based on the peak construction staff vehicle movement described in **Chapter 11** (Traffic and Transport). It is assumed travel is 40 km each way, which is the average distance between the site and Foynes, Ennis or Tralee.
- Emissions associated with the land use change are based upon a conversion of 17 ha of arable grassland to hardstanding.

As detailed in **Table 15.18**, the estimated GHG emissions from the construction phase of the Proposed Development have been calculated to be 110,709 tCO_2e over the course of the 32 month construction period. The majority of emissions (82%) are associated with purchased goods and services (construction materials). Average annual emissions are therefore expected to be approximately 41,620 tCO_2e.

Table 15.18: Estimated Construction GHG Emissions

Scope	Project Activity / Emission Source	Emissions (tCO_2e)	Percentage of Stage Emissions
1- Direct GHG Emissions	Fuel Usage Onsite	8,336	8%
2- Indirect GHG Emissions	Electricity Purchase	339	<1%
3- Indirect Other GHG Emissions (Upstream)	Purchase Goods and Services	90,780	82%
	Upstream Transportation and Distribution	756	1%
	Waste Generated in Operations	1,174	1%
	Worker Transport	7,675	7%
Other	Land Use Change	1,650	1%
Stage Total		**110,709**	

Scope	Project Activity / Emission Source	Emissions (tCO_2e)	Percentage of Stage Emissions
Annual		**41,620**	

To contextualise the magnitude of impact, these emissions have been compared to the current Irish national GHG inventory (EPA, 2019b) (**Table 15.13**). Emissions from the construction phase of the Proposed Development would not contribute to more than 0.11% of the latest Irish GHG inventory.

The magnitude of effect during construction would therefore be considered **Low**. As per **Table 15.4** the significance of effects would be **Minor Adverse**.

15.8.1.2 Operational Phase GHG Emissions

GHG emissions due to activities undertaken during the operation of the Proposed Development are presented below.

The Power Plant will not operate at 100% capacity all year round. The actual operation of the plant will be determined by many factors such as power demand itself, the amount of renewable generation on the system, its bid price into the market compared to other generators, and the rules of the grid to ensure priority is given to renewable generation. The grid also needs to remain stable and secure with increased high levels of renewable generation.

EirGrid has advised the Applicant in pre-application consultations that to ensure grid stability in the context of increased contribution to the grid from renewable sources, the future grid requires flexible gas-fired power plants with high inertia[2], low minimum stable generation and fast response capability. Ireland's National Energy and Climate Plan 2021-2030 supports this advice noting in section 2.4.2 that:

> *In addition, as Ireland transitions itself to a low carbon economy, the gas and electricity networks must be planned and developed to make the transition as smooth as possible. As we make the transition the energy networks in Ireland will face many challenges. For example, as the penetration of electricity generated from wind increases the electricity network must be flexible to handle the unpredictability of wind while still operating in a secure manner. The increased penetration of wind energy also places an increased reliance on Ireland's gas network.*

Finally, the Commission for Regulation of Utilities in their Draft Opening Statement for the Joint Oireachtas Committee on Climate - Sector by sector analysis towards a 51% reduction in emissions by 2030 over 2018 levels, on 6th July 2021 noted:

> *The twin challenges of replacing a large part of our existing generation fleet, while meeting rapidly growing demand, means that a minimum of 2GW of new gas-fired plant will be needed in the next few years. This **flexible** capacity is required to support increased renewables, enable us to retire older carbon intensive plant (coal, peat and oil) and ensure security of supply.* ***[emphasis added]***

Given the above, the Applicant commissioned a detailed market analysis (*the Baringa Shannon Wholesale & Ancillary Revenue Report*) report to consider these issues and model the future operation of the Power Plant from Q3 2025 to 2050. Other power plant configurations were also modelled. The model assumes

[2] One of the challenges with increased renewable (wind) generation on the system is a potential for an increased rate at which the grid frequency falls. This is known as the rate of change of frequency (RoCoF). Events that result in high RoCoF levels can potentially lead to instability in the power system. All power systems, including the Irish power system, have inertia. Inertia is a resistance to change in motion. The inertia on the power system resists the RoCoF and helps maintain system stability.

the 70% renewable by 2030 and considers the detailed requirements of the system operator (EirGrid) to keep the grid stable and secure.

In conclusion, analysis confirmed that the flexibility of the Power Plant, including the BESS, is ideally aligned with a high-renewable market from now to 2050. In particular, the Power Plant offers the market high inertia, very low minimum stable generation and fast response capability. The detailed results from the modelling of the Power Plant future operations are confidential, but the CO_2 emissions presented in this chapter are taken from this model.

The 120-Megawatt (1-hour) BESS will comprise of 27 battery containers that house lithium ion batteries. Due to its fast response, the BESS allows the Power Plant to provide electricity during 'ramp up' and can provide quick power to the grid in times of fluctuating renewable energy generation. Once the Power Plant is operating at the necessary capacity and the electrical demand is met, the BESS will be shut down and recharged directly from the Power Plant. It is estimated that the BESS will be used 187 times each year.

The BESS can also charge from the grid. For example, if there were high renewable generation levels on the Irish power system at any one time, the BESS could charge from the grid instead of the power plant. This might be done as wholesale power prices would be lower than the Power Plant at that instant. However, for the purposes of calculating emissions from the BESS, a conservative assumption was taken that the BESS would charge only from the Power Plant only. (i.e. from Natural Gas fuel).

In order to estimate additional emissions resulting from the use of the BESS, the following assumptions have been made:

- The BESS will be charged directly by the power generated by the CCGT, *i.e.*, it will be a parasitic load on the plant.
- Each of the 187 times that the BESS is used each year will involve a full discharge-charge cycle, with all the 120 MWh of energy stored being used.
- The round-trip efficiency of the charge-discharge cycle is 80%.
- Applying these assumptions, together with the emissions factor for natural gas and the stated operational efficiency of the CCGT, it is estimated that the use of the BESS will result in additional emissions of 1,673 tonnes CO_2e in 2026, the first full year of operation. Over the lifetime of the Proposed Development, use of the BESS contributes additional emissions of 41,724 tonnes CO_2e, which is 0.2% of direct operational emissions from the CCGT without use of the BESS. These stated emissions associated with the BESS system do not consider any high carbon peaking plant that may be displaced through the use of the BESS for grid balancing purposes.

Calculations of GHG emissions are based on the following conditions using a mixture of existing Proposed Development information, industry benchmarks and professional judgement. The following assumptions, inclusions and exclusions, made on a precautionary basis, have been used in this calculation:

- An operational life of 25 years (to 2050), active every day, all day. After this time, the Proposed Development may be transitioned from a natural gas to a hydrogen-powered facility subject to technology availability and feasibility and approval from planning authorities. There is currently not enough information to include this consideration into the assessment.
- No planned downtime for maintenance.

- Other Scope 1 emissions included are those from emergency/ backup/ auxiliary plant. As described in **Chapter 08** (Air Quality), this comprises seven units, each operating for 52 hours per year. It has been assumed that each item has a power rating of 1000 kW.
- Carbon emissions associated with annual electricity generation have been taken from the Sustainable Energy Authority of Ireland's emission factor applied for natural gas with a 204g per kWh net calorific value.
- Energy usage used to recharge the BESS has been included using the methodology stated above.
- Materials and products used include 35 m^3 per hour potable / fresh water for welfare and fire protection systems only, as per **Chapter 06** (Water). A maintenance schedule is not available and therefore maintenance materials have not been included.
- Indirect upstream emissions associated with emissions from purchased fuels (extraction, production, and transportation) used or processed within the Proposed Development. These are known as Well-to-Tank (WTT) emissions and are subject to a degree of uncertainty as we project into the future. How future WTT emissions have been calculated is detailed below. WTT emissions are assumed to cover emissions associated with the water bath heaters, and the boilers at the AGI.
- Wastes have been calculated in line with the estimates detailed in **Chapter 16** (Waste Management), assuming 81% is recycled and 19% disposed of at landfill (EPA, 2018).
- A total workforce of 92 operational workers on site each day. Commuters are assumed to be travelling 40 km each way, based on the average distance from significant urban areas.

As detailed in **Table 15.19**, the total GHGs estimated to be emitted from the operational phase of the Proposed Development have been calculated to be 21,742,544 tCO_2e over the course of the 25-year period. The large majority of emissions (92.9%) would be associated with the combustion of gas at the Power Plant, with a further 7.0% from Well-To-Tank transmission. The remaining comes from minor sources such as the embodied carbon in purchased goods and services, upstream transportation and distribution, waste disposal and employee commuting.

Table 15.19: Operational GHG Emissions (tCO_2e)

Scope	Project Activity / Emission Source	2026: Annual Emissions (tCO_2e)	2030: Annual Emissions (tCO_2e)	2050: Annual Emissions (tCO_2e)	Total Emissions (tCO_2e)
1- Direct GHG Emissions	Fuel Usage Onsite (all CCGT)	1,184,952	853,890	613,841	20,198,359
3- Indirect Other GHG Emissions (Upstream)	Purchased Goods and Services	53	53	53	1,316
	Fuel and Energy-Related Activities (not included in Scope 1 or 2) (WTT)	76,595	60,149	57,682	1,519,971
	Waste Generated in Operations	351	351	351	8,774
	Employee Commuting	565	565	565	14,124
Other	Land Use Change	0	0	0	0

Scope	Project Activity / Emission Source	2026: Annual Emissions (tCO_2e)	2030: Annual Emissions (tCO_2e)	2050: Annual Emissions (tCO_2e)	Total Emissions (tCO_2e)
	Total	**1,262,516**	**915,008**	**672,492**	**21,742,544**
				Annual average	**869,702**

The Climate Action and Low Carbon Development (Amendment) Act 2021 set binding targets of cutting GHG emissions in Ireland by 51% by 2030 based on a 2018 baseline, with the aim of reaching carbon neutrality by 2050. Ireland's baseline GHG emissions in 2018 were 60,935 $ktCO_2e$, meaning that overall national GHG emissions will have to reduce to 31,077 $ktCO_2e$ per annum by 2030.

To provide context, direct emissions from the Proposed Development in 2030 would equate to approximately 2.8% of Ireland's estimated emissions allowance. This excludes indirect well-to-tank emissions as these are not included in Ireland's emissions inventory. The magnitude of impact during operation would therefore be considered **High**. As per **Table 15.4**, the significance of effects would be **Major Adverse**. It is acknowledged however that without a supply of gas-powered electricity generation, Ireland would not meet its 80% by 2030 renewable energy electricity target, in turn allowing Ireland to meet is national carbon reduction target. Furthermore, direct operational emissions from the Proposed Development will be covered by the EU ETS. The EU ETS operates in trading phases, with the current Phase 4 running from 2021-2030. The EU-wide emissions cap will reduce by an annual rate of 2.2% for the period 2021-25 (European Commission, 2021). This annual reduction rate is set to increase from 2026 onwards as the European Union acts to meet more ambitious emissions reductions targets. It must be noted that the annual reduction in the EU ETS emissions cap (the 'linear reduction factor') is binding on the EU traded sector as a whole, and not on any one individual installation.

Alternative Gas Fired Electricity Energy Generation

As discussed, for Ireland to meet its 2030 target for 80% of electricity generation from renewable energy the remaining 20% will predominantly have to be met from natural gas-powered generation. From 2025 onwards, natural gas fired electricity generation comes from a mixture of OGCT plant and CCGT plant. Any OCGT plant on the Irish network is less efficient than a CCGT and therefore likely to be dispatched after the Proposed Development.

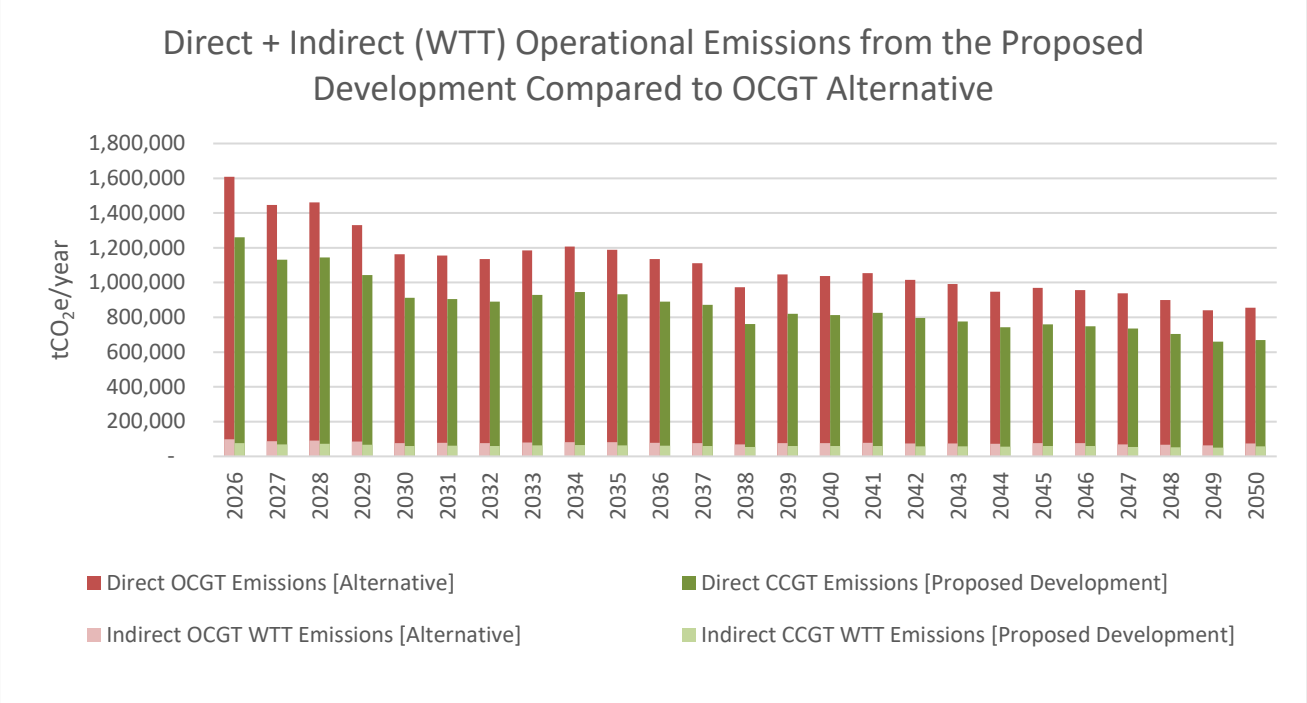
Figure 15.1 shows annual emissions from the Proposed Development running on Irish grid supplied natural gas together with an alternative counterfactual scenario i.e. an OGCT running on natural gas from Ireland's gas grid producing the equivalent amount of power. OCGT efficiency has been based on published data for efficiency and intensity of different plant types from the UK in the absence of Irish-specific data (UK Parliament).

The carbon impact of the proposed CCGT Power Plant is significantly lower than an equivalent OCGT, when we consider the gas combustion within the Power Plant, and the upstream 'Well to Tank' (WTT) emissions from the production and delivery of this gas. The CCGT is more efficient than the equivalent OCGT.

It is not possible to state exactly which power generation unit will be displaced by the Proposed Development as this will depend on a number factors including the volume of energy generated by renewables and the availability via grid interconnectors. In summary however, where the proposed CCGT

plant displaces less efficient OGCT power generators on the grid, this will result in lower direct GHG emissions to generate the equivalent amount of energy.

Figure 15.1: Proposed Development and Alternative Scenario Operational Emissions



15.8.2 In-Combination Climate Change Impacts

15.8.2.1 Construction Phase ICCI impacts

During construction, environmental and social receptors may experience exacerbated project impacts through changing climates hazards. These could include:

- increased risks to soil quality and air quality (dust production) through construction activities combined with reduced rainfall, increased temperatures, increased droughts and heatwaves.
- increased risks of noise disturbance to residents through construction noise combined with increased summer temperatures (open windows).
- increased risks to soils, marine and aquatic river quality through construction ground disturbance and sea level rise, increased storm intensity and rainfall.

15.8.2.2 Operational Phase ICCI impacts

Technical specialists have undertaken a review of climate change hazards to understand if climate change would exacerbate any project risks to their receptors. No potential ICCIs have been identified by technical specialists and therefore no further mitigation or monitoring has been recommended.

15.8.3 Climate Change Resilience

15.8.3.1 CCR Construction & Operation Impacts

The potential impacts and effects of projections for climate change to the Proposed Development are detailed in **Table 15.20** and are based upon that scoped into the assessment (see **Table 15.11**).

It is noted that climate projections are not available for the construction time period, construction risks have therefore been assessed against the same projections as for operation. This may overestimate changes in

the climate during for the construction period, however these are considered a reasonable worst-case-scenario approach.

- Inaccessible construction site due to severe weather event (flooding, snow and ice, storms) restricting working hours and delaying construction.
- Health and safety risks to the workforce during severe weather events.
- Unsuitable conditions (due to very hot weather or very wet weather, for example) for certain construction activities.
- Damage to construction materials, plant and equipment, including damage to temporary buildings/ facilities within the Site boundary, such as offices, compounds, material storage areas and worksites, for example as a result of stormy weather.

Table 15.20: Potential CCR Impacts and Relevant Embedded Adaptation / Resilience Measures

Climate Hazard Type	Climate Hazard Projection	Sensitive Receptor	Description of Potential Impact	Embedded Design Measure	Likelihood of Impact Occurring	Consequence of Impact Occurring	Resilience Risk Level	Significant?	Additional Mitigation or Monitoring Measures
Construction									
Extreme Rainfall	Likely	Access roads, construction materials and equipment	Extreme rainfall events resulting in flooding, preventing access to site and delaying construction. Damage to material stockpiles / foundations due to flooding.	An outline emergency response plan and procedure for environmental incidents such as flooding or storms. Storage of topsoil and other construction materials to protect against high rainfall and flooding events. Laydown and welfare areas would be laid with permeable membranes to protect the Proposed Site from high rainfall and flooding events.	Unlikely	Medium	Minor	No	None Required
		Construction workforce	Extreme rainfall events to cause unsuitable working conditions.	Development of the Construction Environmental Management Plan (CEMP).	Unlikely	Medium	Minor	No	None Required
Extreme Heat	Likely	Construction workforce	Extreme temperatures preventing suitable working conditions and delaying construction.	Contractor to monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions.	Unlikely	Low	Minor	No	None Required
Droughts	Likely	Material storage, worksites, construction workforce	Increased dust generation due to reduced rainfall causing hazard to workforce and potential degradation of materials.	Best practice standards, environmental guidelines and mitigation measures will be defined in the CEMP and adhered to in order to minimise dust generation.	Unlikely	Low	Minor	No	None Required

Climate Hazard Type	Climate Hazard Projection	Sensitive Receptor	Description of Potential Impact	Embedded Design Measure	Likelihood of Impact Occurring	Consequence of Impact Occurring	Resilience Risk Level	Significant?	Additional Mitigation or Monitoring Measures
Operation									
Extreme Heat and Heatwaves	Likely	Assets, facilities, roads	Overheating of electrical equipment. Heat damage, deformation, cracking and thermal expansion of building surfaces and pavements.	Electrical connections would be buried underground, insulating against overheating in times of heatwaves.	Very Unlikely	Medium	Negligible	No	None Required
		Staff, visitors onsite	Impacts on the thermal comfort of building users Increase in ambient temperature of buildings, leading to higher air conditioning requirements and impacts on the thermal comfort of building users.	Detailed design of air conditioning units for offices would include an allowance for future rise in ambient temperature. All buildings would be designed to Irish standards and specifications.	Likely	Low	Negligible	No	None Required
		Function of facility	Reduced efficiency of CCGT operations. An increase in summer temperature could impact the base load plant efficiency.	The Power Plant is designed to operate over a large range of ambient conditions and the plant efficiency difference is less than 1% from high to low. Temperature changes would not have a noticeable impact. The efficiency impact would also be less when the plant is operating at lower loads.	Likely	Low	Minor	No	None Required
Droughts	Likely	Assets, facilities, roads	Water shortages. Drying out of pavement structures. Deterioration of structures or foundations due to decrease in soil moisture levels. Insufficient water for plant cooling.	The Power Plant utilises air cooled heat exchangers rather than use of cooling water. Buildings would utilise water efficient fixtures. All buildings would be designed to Irish standards and specifications.	Very Unlikely	Low	Negligible	No	None Required

Climate Hazard Type	Climate Hazard Projection	Sensitive Receptor	Description of Potential Impact	Embedded Design Measure	Likelihood of Impact Occurring	Consequence of Impact Occurring	Resilience Risk Level	Significant?	Additional Mitigation or Monitoring Measures
Extreme rainfall	Possible	Built terrestrial assets, staff facilities and access routes to sites Staff, contractors and visitors.	Surface water flooding and standing waters Deterioration of structures or foundations due to increase in soil moisture levels. Damage to building surfaces/ exposed utilities from increased drying / wetting and increase frost penetration. Loss or damage to materials.	The FRA considers climate change considerations of the 'mid-range' and 'high end' future scenarios including increases in extreme rainfall, flood flow and flash flood times. Development footprint avoidance of Flood Zones A and B. Finished floor level of the Substation to be constructed at the 0.1% AEP level plus a freeboard allowance of 600 mm. Finished floor level of the remainder of the facility to be constructed at the 1% AEP level plus a freeboard allowances of 600 mm. Use of attenuation ponds to hold peak discharges from storm events to reduce flash flooding onsite. These would be built in accordance with the SuDS manual and designed for a 1 in 100-year event plus a 20% allowance for climate change.	Unlikely	Medium	Minor	No	None Required

Climate Hazard Type	Climate Hazard Projection	Sensitive Receptor	Description of Potential Impact	Embedded Design Measure	Likelihood of Impact Occurring	Consequence of Impact Occurring	Resilience Risk Level	Significant?	Additional Mitigation or Monitoring Measures
Storm Events	Very Unlikely	Built terrestrial assets, staff facilities and access routes to site Staff, contractors and visitors.	Increase to rainfall leading to increases in fluvial flows Greater storm surge generation. Surface water flooding and standing waters. Deterioration of structures or foundations due to increase in soil moisture levels. Damage to building surfaces / exposed utilities from increased drying/ wetting and increase frost penetration. Damage to infrastructure through coastal erosion, storm surge and coastal destabilisation.	The FRA considers climate change considerations of the 'mid-range' and 'high end' future scenarios including increases in extreme rainfall, flood flow and flash flood times. Development footprint avoidance of Flood Zones A and B. Finished floor level of the Substation to be constructed at the 0.1% AEP level plus a freeboard allowance of 600 mm. Finished floor level of the remainder of the facility to be constructed at the 1% AEP level plus a freeboard allowance of 600 mm.	Unlikely	Medium	Minor	No	None Required

Climate Hazard Type	Climate Hazard Projection	Sensitive Receptor	Description of Potential Impact	Embedded Design Measure	Likelihood of Impact Occurring	Consequence of Impact Occurring	Resilience Risk Level	Significant?	Additional Mitigation or Monitoring Measures
Sea level rise	Very Likely	Built terrestrial assets, staff facilities and access routes to site Staff, contractors and visitors.	Coastal flooding and standing waters. Deterioration of structures or foundations due to increase in soil moisture levels. Damage to building surfaces. Exposed utilities from increased drying / wetting.	The FRA considers climate change consideration of the 'mid-range' and 'high end' future scenarios that include sea level rise. Finished floor level of the Substation to be constructed at the 0.1% AEP level plus a freeboard allowance of 600 mm. Finished floor level of the remainder of the facility to be constructed at the 1% AEP level plus a freeboard allowance of 600 mm. Use of attenuation ponds to hold peak discharges from storm events to reduce flash flooding onsite. These would be built in accordance with the SuDs manual and designed for a 1 in 100-year event plus a 20% allowance for climate change. All building to be designed to Irish standards and specifications.	Unlikely	High			

15.9 Additional Mitigation

A number of embedded mitigation measures have been realised through the iterative design process and have been incorporated into the design of the Proposed Development. The following embedded controls and mitigation measures to reduce GHG emissions, the likelihood of an ICCI and to reduce vulnerability have been proposed.

15.9.1 Construction Phase

15.9.1.1 GHG Emissions Impact Assessment

To reduce carbon emissions during the construction phase, embedded controls and mitigation measures as outlined in the Construction Environmental Management Plan (CEMP) include:

Energy Consumption:

- To reduce fuel deliveries, sizeable sized diesel tanks would be held onsite.
- Site personnel will be encouraged to use green transport options, including car-pooling, public transport, walking and cycling.
- Material transport associated with the project will be assessed in order to reduce associated carbon expenditure. The Contractor will engage the supply chain to reduce the number of vehicle movements relating to site material.
- Vehicles and plant with low exhaust emissions will be used and will be serviced regularly. Engines will not be left running unnecessarily. In addition, vehicles will be monitored entering the site for noticeable exhaust emissions and site security personnel will have the power to ban offending vehicles from the site.
- Energy efficiency measures will be installed in all offices and drying rooms; sprung door closers in external doors, awareness notices to save energy, timers on heaters and boilers, passive infrared (or similar) sensors for lighting where possible and supervision to switch off other lights, computers, etc. at the end of the day. Energy consumption will be logged and monitored through an electrical meter.

Materials:

- Waste generated during the construction phase will be carefully managed according to the accepted waste hierarchy which gives precedence to prevention, minimisation, reuse and recycling over disposal with energy recovery and finally disposal to landfill.
- Reuse of excavated soil where possible, any that is unsuitable for engineering will be used for landscaping.
- Locally sourced materials, purchasing recycled materials, sustainably sourced certified timber;
- Purchasing of materials for just-in-time delivery.
- Designation of separate storage areas for different types of waste, in order to maximise the reuse and recycling potential of the waste.

Other statutory requirements:

- Development of the CEMP prior to construction.
- Resource and Waste Management Plan.

- Undertaking construction works in accordance with all legal, regulatory and licence conditions, including the Safety, Health and Welfare at Work (Construction) Regulations, NSAI Construction Standards and the Construction Industry Federations Construction Standard Operating Procedures.

15.9.1.2 In-Combination Climate Change Impacts

Full details of the embedded design measures that reduce likelihood or severity of climate change hazards exacerbating construction impacts are detailed within the CEMP and other discipline assessments.

Other statutory requirements:

- Development of the CEMP.
- Undertaking construction works with all legal, regulatory and licence conditions.

15.9.1.3 Climate Change Resilience

Full details of the embedded design measures that reduce the vulnerability of the Proposed Development are detailed within the CEMP and other discipline assessments. A summary of these measures includes:

- An outline emergency response plan and procedure for environmental incidents such as flooding or storms.
- Storage of topsoil and other construction materials to protect against high rainfall and flooding events, or sea level rise.
- Suitable storage and bunding of pollutants to protect from high rainfall events or sea level rise.
- Laydown and welfare areas would be laid with permeable membranes to protect the Site from high rainfall and flooding events or sea level rise.

Other statutory requirements:

- Development of the CEMP.
- Undertaking construction works in accordance with all legal, regulatory and licence conditions.

15.9.2 Operational Phase

15.9.2.1 GHG Emissions Impact Assessment

The operation of the Proposed Development will lead to unavoidable GHG emissions. Operations will therefore be undertaken in accordance with all legal, regulatory and licence conditions to minimise the GHG impact. The role of the Proposed Development in displacing higher carbon intensity, fossil-fuelled energy sources must also be considered when assessing the overall GHG impact.

15.9.2.2 In-Combination Climate Change Impacts & Climate Change Resilience

No significant ICCI or CCR risks identified, so no further mitigation measures are required beyond what is currently included in the design as presented in **Table 15.20.**

Monitoring will be undertaken in accordance with all legal, regulatory and licence conditions.

15.10 Cumulative Impact

15.10.1 GHG Emissions Impact Assessment

Climate change is the result of cumulative impacts. As it is the result of innumerable minor activities, a single activity may itself result in a minor or insignificant impact, but when combined with many other activities, the cumulative effect could be significant. The nature of GHG is such that their impact on receptors (global climate) is not constrained by their location or source. The GHG emissions assessment by its nature is a cumulative assessment and considers whether the Proposed Development would contribute significantly to emissions on a national level. By comparing the Proposed Development against the national inventory, as being representative of the global climate, the cumulative impact of the scheme is being considered on a national scale.

The global atmosphere is the receptor for climate change impacts and has the ability for holding GHG emissions. Nevertheless, as stated by IEMA guidance (2022), all GHG emissions are considered significant and therefore would contribute to climate change. While the impact of any individual proposed development may be limited, it is the cumulative impact of many proposed developments over time that could have a significant effect on climate change.

As such, it is not possible to define a study area for the assessment of cumulative effects of GHG emissions, nor to undertake a cumulative effects assessment, due to the geographically unconstrained nature of GHG emissions. Consequently, effects of GHG emissions from specific cumulative projects should not be assessed as there is no basis for selecting any particular cumulative project over any other.

When addressing the cumulative impact of the Proposed Development it should also be considered on a sectoral scale. As previously noted, while the Proposed Development will result in direct emissions from the combustion of fossil fuel, this is seen as necessary if the overall impact of electricity generation on the climate is to be reduced through the introduction of higher renewable generation capacity.

As described previously, separate to this planning application, the wider site is also intended to be further developed with 220 kV and medium voltage (10 / 20 kV) power lines, as well as a possible future Strategic Gas Reserve Facility and data centres which will be subject to a future consent. The cumulative impact of wider site activities has not been assessed, but it should be noted that the emissions calculated within this assessment are part of a wider masterplan.

15.10.2 In Combination Climate Change Impact and Climate Change Resilience Assessments

No cumulative climate change risks have been identified due to the lack of other proposed projects within the vicinity of the Site. Therefore, cumulative effects have not been assessed as a part of these assessments.

15.11 Residual Impacts

This section identifies the residual effects, following the implementation of mitigation and monitoring measures outlined.

15.11.1 Construction Phase

15.11.1.1 GHG Impact Assessment

There would be unavoidable GHG emissions resulting from the construction phase of the Proposed Development as materials, energy and fuel use, and transport would be required. However, with embedded mitigation measures their effects have been assessed as **Minor Adverse**. No further mitigation and monitoring measures (other than that detailed in **Section 15.9**) have been recommended therefore the residual effect of **Minor Adverse** remains unchanged with **No Significant** effects expected.

15.11.1.2 CCR / ICCI Assessment

CCR and ICCI were assessed semi-quantitatively in this assessment. **No Significant** CCR or ICCI impacts were identified, therefore embedded mitigation measures were deemed sufficient for construction phase impacts, therefore the residual effect of no significance remains unchanged.

15.11.2 Operational Phase

15.11.2.1 GHG Impact Assessment

There would be unavoidable GHG emissions resulting from the operational phase of the Proposed Development as materials, energy and fuel use, and transport would be required. The fuel consumption associated with the operating of the Power Plant would contribute the majority of the operational phase emissions. Operational emissions have been assessed as **Major Adverse**, and therefore **Significant**. However, the Proposed Development will provide an alternative electricity supply to the typically intermittent electricity supply from wind power, enabling the expansion of renewable energy generation capacity and the transition to a reliable and consistent low carbon energy network through comparatively fast response times and the integration of the BESS. The Proposed Development is also likely to displace older, more carbon-intensive power sources, leading to a net reduction in the GHG emissions of the Irish power sector. Additionally, the Proposed Development has the potential to transition fuel sources from natural gas to lower carbon fuels *(i.e.* hydrogen) to further assist in the pathway towards net zero.

It is important to note that the emissions associated with the Power Plant could reduce over time based upon projected running hours. For example, emissions for the opening year for the plant running at maximum capacity are estimated at 1,262,516 tCO_2e and by 2050 these emissions are estimated to be 672,492 tCO_2e.

Further, the specifications of the Proposed Development are such that it would be required to have a GHG Permit, to submit annual emissions reports and to surrender sufficient EU Allowances to cover its annual emissions under the terms of the EU Emissions Trading System. These requirements do not affect the significance of these emissions.

15.11.2.2 CCR / ICCI Assessment

CCR and ICCI were assessed semi-quantitatively in this assessment. **No Significant** CCR or ICCI impacts were identified, and embedded mitigation measures were deemed sufficient for operational phase impacts, therefore the residual effect of no significance remains unchanged.

15.12 Summary

The requirement for the Proposed Development supports the implementation of the Climate Action Plan 2024, the National Energy and Climate Plan 2021-2030 and many other climate change polices. Ireland has set an ambitious target for 80% of electricity generation capacity to be from renewable sources by 2030. The Proposed Development accords with the relevant policy at a European, National, regional and local level and facilitates the transition to a more renewables-based national electricity system, providing an efficient and flexible plant combined with a modern BESS system.

Emissions from the Proposed Development will equate to around 2.8% of Ireland's carbon allowance in 2030, a major adverse impact, however without the supply of dispatchable energy from gas fired power stations to support the wider decarbonisation of the economy, these reduction targets may not be met.

A number of embedded mitigation measures have been developed through the design process to reduce GHG emissions throughout its design life including measures to reduce energy and material consumption. Further, in the future it is likely that the Power Plant may be transitioned from a natural gas to a hydrogen-powered facility which would substantially reduce GHG emissions and aid the further decarbonisation of the national grid.

While it is acknowledged that the operation of the Proposed Development will generate GHG emissions, the need for increased generation capacity is recognised as a national priority in the Irish Government's Policy Statement on Security of Electrical Supply (DECC, 2021b). When considering the context of the need and policy support for the Proposed Development, in addition to its consistency with the Climate Action Plan 2024, significant negative impacts on the global climate receptor are considered unlikely.

The Site and surrounding environment is likely to experience a range of climate change impacts including increasing temperatures, reductions in annual and summer rainfall but possible wetter winters, more periods of drought, increased severity of storms, and sea level rise.

This assessment looked at the influence of climate change to the Project-related impacts to neighbouring sensitive receptors. Technical specialists used the climate change projections to examine if there were any changes to either the likelihood or severity of impact to their receptors, however no combined impacts were identified.

This assessment also looked at the influence of climate change on the Proposed Development itself, particularly its physical and functional aspects. Any identified vulnerabilities were found to be sufficiently mitigated against by aspects of the design with no significant risks identified.

Table 15.21: Summary

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Effect Significance
Construction	GHG Emissions	High		Minor adverse	• Development and implementation of the CEMP, where measures to reduce GHG emissions are detailed. • Encouragement of green transport options for commuting, installation of energy efficient measures and engage the supply chain to reduce the number of vehicle movements relating to site material. Waste management plan: • Maximising reuse and recycling of waste, i.e. Reuse of excavated soil where possible. • Using locally sourced materials, using Ground Granulated Blast Furnace Slag (GGBS) concrete, purchasing recycled materials, sustainably sourced certified timber. See **Section 2.4.1** of **Chapter 02** (Description of the Proposed Development).	**Minor adverse**
Construction	In-combination Climate Change Impacts	Not assessed / Not applicable		Not assessed-No Significance	• Development and implementation of the CEMP, where measures to reduce impacts to sensitive receptors are detailed. • Undertaking construction works with all legal, regulatory and licence conditions. See **Section 2.4.1** of **Chapter 02** (Description of the Proposed Development).	**Not assessed - No Significance**
Construction	Climate Change Resilience	Not assessed / Not applicable		Not assessed-No Significance	• Development and implementation of the CEMP, where measures to protect construction assets and materials are detailed. • An outline emergency response plan and procedure for environmental incidents such as flooding or storms. • Storage of topsoil and other construction materials to protect against high rainfall and flooding events, or sea level rise. • Suitable storage and bunding of pollutants to protect from high rainfall events or sea level rise. • Laydown and welfare areas would be laid would permeable membranes to protect the Site from high rainfall and flooding events or sea level rise. • Undertaking construction works with all legal, regulatory and licence conditions.	**Not assessed - No Significance**

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Effect Significance
Operational	GHG Emissions	High	• The Proposed Development does not in itself increase demand for natural gas or electricity. • As the use of coal and peat for electricity generation will continue to decrease under the Climate Action Plan 2024, natural gas has been identified in the Climate Action Plan, and the National Energy and Climate Plan, as the only remaining dispatchable power source capable of providing significant security of electricity supply when wind sources are insufficient.	Major adverse	• Expected reduced operating hours over the life of the Power Plant. • Diesel Firewater Pump is operated in emergency only and would not be running during normal operations. • Black Start Diesel Generator used for initial start-up only and would not be running during normal operations. • Auxiliary Boiler is only operated when all CTG / HRSG Trains are not in operation to facilitate a unit start. • The Proposed Development will operate in the EU ETS scheme, with an EU-wide cap currently reducing by 2.2% annually. Sufficient allowances to cover an installation's annual emissions must be surrendered each year. Power generators are not eligible for any free allocation of allowances, so all allowances to cover the direct emissions from the Proposed Development must be purchased at auction. • In a 'business as usual' scenario, where the Proposed Development is not progressed, this demand would be met by alternative, and potentially more carbon intensive power suppliers. • The efficiency of the Power Plant combined with its ability to operate at a low minimum generation capacity means that the Power Plant will be dispatched ahead of a less efficient OCGT power plant as it will provide lower direct emissions. • The proposed Power Plant will not operate at 100% capacity all year round. • As the level of renewable generation on the system at any one time increases, thermal power plant has their dispatch quantities decreased by EirGrid to facilitate the output of the renewable power plants. However, a certain number of dispatchable plants must remain on the system to provide the services mentioned above. 'Positioning' is when the grid operator keeps a power plant running so as to be on standby to provide these services to the grid operators in real time. This is a vital process for grid stability; however, with inflexible power plants it can lead to larger than necessary power plants being positioned. This causes increased emissions, increased curtailment of renewables (to make room for the positioned power plant) and increased costs.	**Major Adverse - Significant**

Proposed Development Phase	Aspect / Impact Assessed	Existing Environment / Receptor Sensitivity	Effect / Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the CEMP)	Residual Effect Significance
					• The ability of the Power Plant to operate at a 50% blend of hydrogen by design, offers the potential for the Power Plant to become even more efficient in emission terms over the period to 2050 as and when the required policies and supply chains for hydrogen are implemented. • The Proposed Development has a unique location and flexible design that can easily transition to alternative low carbon fuels, subject to future planning applications, once the technology and public policies are established. See **Section 2.4.1** of **Chapter 02** (Description of the Proposed Development).	
Operational	In-combination Climate Change Impacts	Assessed by other disciplines		No significance	• Detailed within other discipline assessments. • Undertaking operations with all legal, regulatory and licence conditions. See **Section 2.4.2** of **Chapter 02** (Description of the Proposed Development).	**No significance**
Operational	Climate Change Resilience	Not assessed / Not applicable		No significance	See **Table 15.20**Table 15.20 for details on embedded mitigation for CCR.	**No significance**

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