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INTRODUCTION

Background

9.1 This Chapter of the EIA was prepared by SLR Consulting and will identify, describe, and assess the direct and indirect significant effects of the Proposed Development on the climate and the impacts of the climate on the Proposed Development. Where required appropriate mitigation measures to avoid, prevent or reduce and, if possible offset likely significant, adverse effects to climate are recommended.

Summary of the Proposed Development

9.2 The Proposed Development replaces the existing energy systems at the Medite factory with two new biomass-fired plants, one for each of Medite's production lines. The existing boilers are approaching the end of their design life. Their replacements will guarantee the continued operation of the plant, lead to greater energy security from a reliable renewable biomass source replacing the use of fossil fuels and unreliable reclaimed biomass. An overview of the current plant with biomass routes are presented in Figure 9-1 below. Flow charts of the current operation and the Proposed Development with approximate fuel use based on uplift to 186,000 tonnes of biomass have also been provided in Figure 9-2 and 9-3

9.3 The proposed replacement energy plants will meet the factory's heat requirement. They will introduce new, modern combustion, air filtration, and treatment systems in line with European emissions performance for the best available technology.

9.4 This investment in new renewable energy systems will bring several benefits to Medite both in terms of competitiveness and efficiency as a manufacturing facility and in respect of its ability to meet new environmental targets for carbon emissions reductions. The potential benefits include:

- Reduced carbon emissions by reducing natural gas consumption and increasing use of production residue as fuel.
- Reduced energy costs as the Proposed Development will allow the site to use more of its currently unviable biomass residues for heat energy generation.

9.5 The following has been provided to give an outline of the current and Proposed Development:

- The 6 MWth gas powered boiler is to remain as back up only.
- The existing biomass boilers on line 1 totalling 36MWth will be replaced with a new renewable energy boiler with a capacity of 60MWth.
- The existing biomass boiler for line 2 (19MWth) will be replaced with a new renewable energy boiler with a capacity of 30MWth.
- The current operation has other fuel use from LPG and Diesel oil, the emissions from these are not expected to change.

9.6 The current system uses around 111,000 tonnes of biomass fuel for energy per year. The maximum capacity of fuel that will be consumed by the proposed renewable energy plants has been calculated as approximately 169,000 tonnes per year. An extra margin of 10% to cater for variation in fuel mix and moisture content has been assessed in the design to give

a potential maximum biomass fuel consumption of 186,000 tonnes per year. All calculations for the Proposed Development in this chapter have used the elevated figure of 186,000 tonnes.

9.7 The new renewable energy plants will use the on-site wood biomass production residues (from Medite's own MDF manufacturing processes) currently consumed by the existing biomass fired energy systems approximately 52,000-71,000 tonnes. It will also use the approximately 19,000-24,000 tonnes of bark each year that is currently transported off site. The existing biomass fired energy systems do not have the capacity to deal with such a volume of wetter fuel. The required balance of fuel (110,000 tonnes) will consist of wood biomass fuel from forestry residues, delivered to site by HGV.

Figure 9-1 Current plant, including typical annual fuel usage biomass inputs and Proposed Biomass Inputs

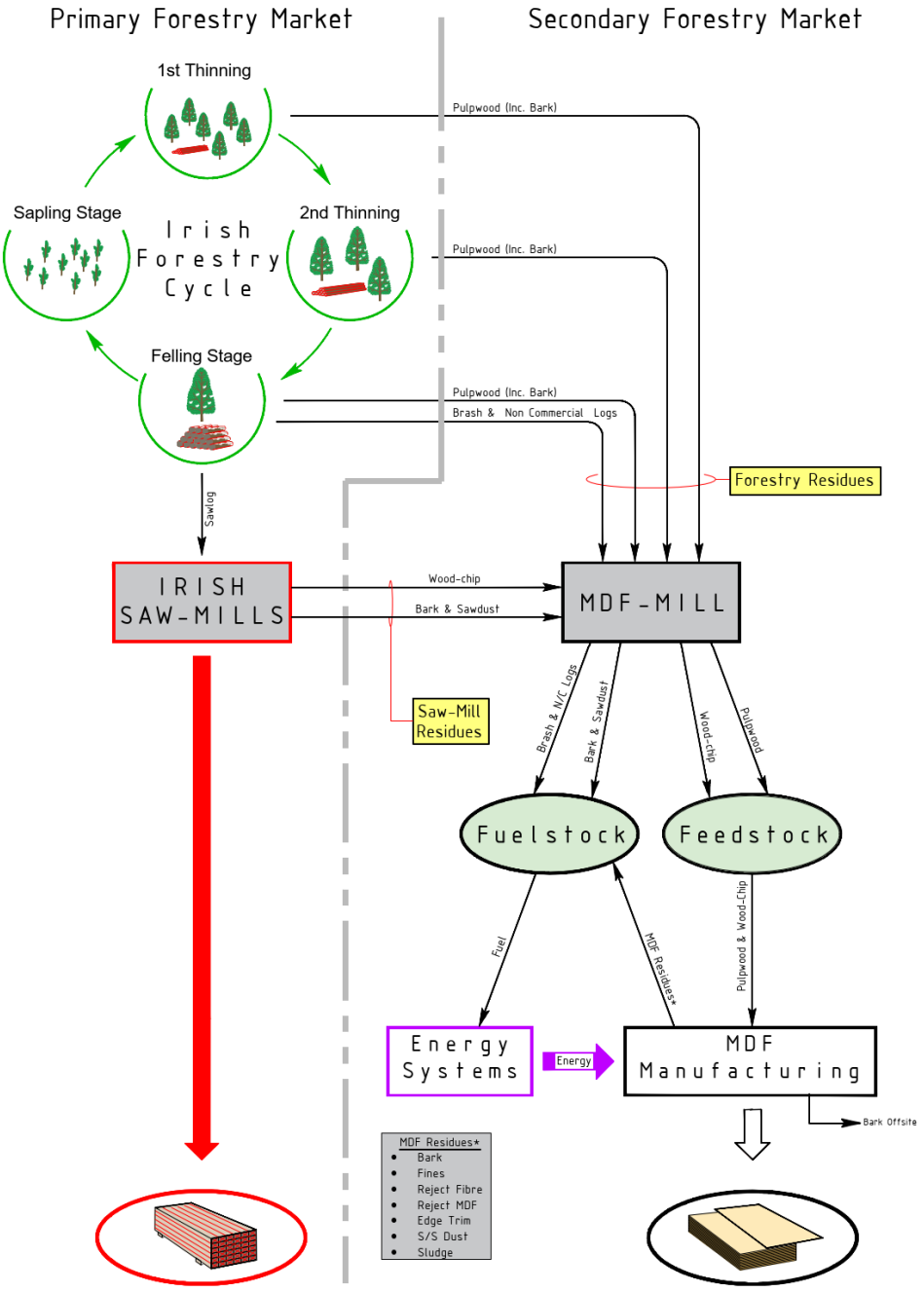


Figure 9-2 Current Development Approximate Fuel Use

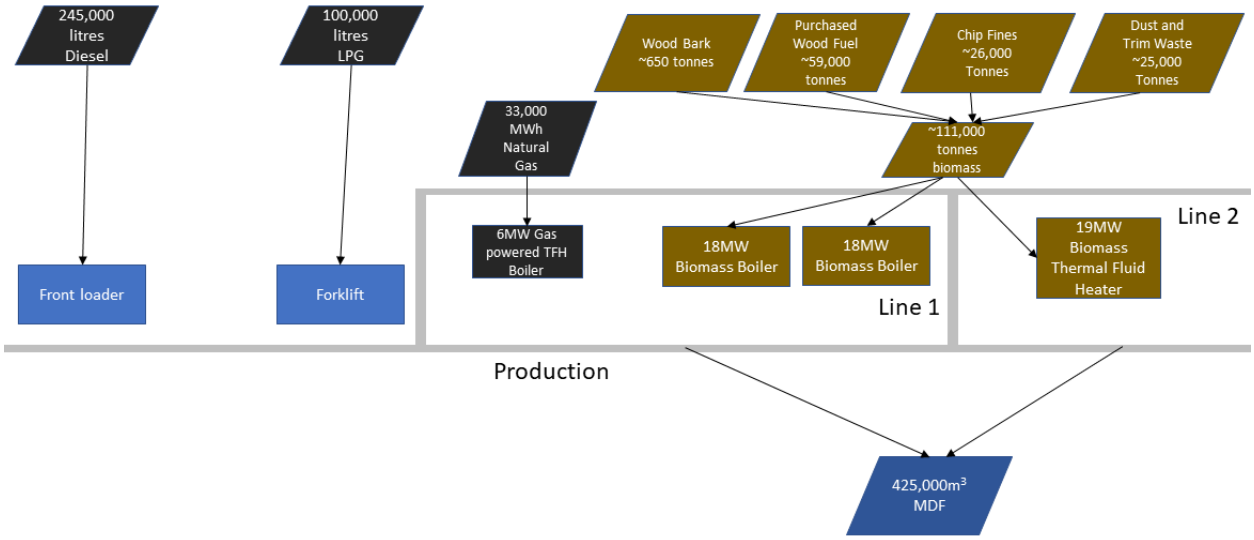
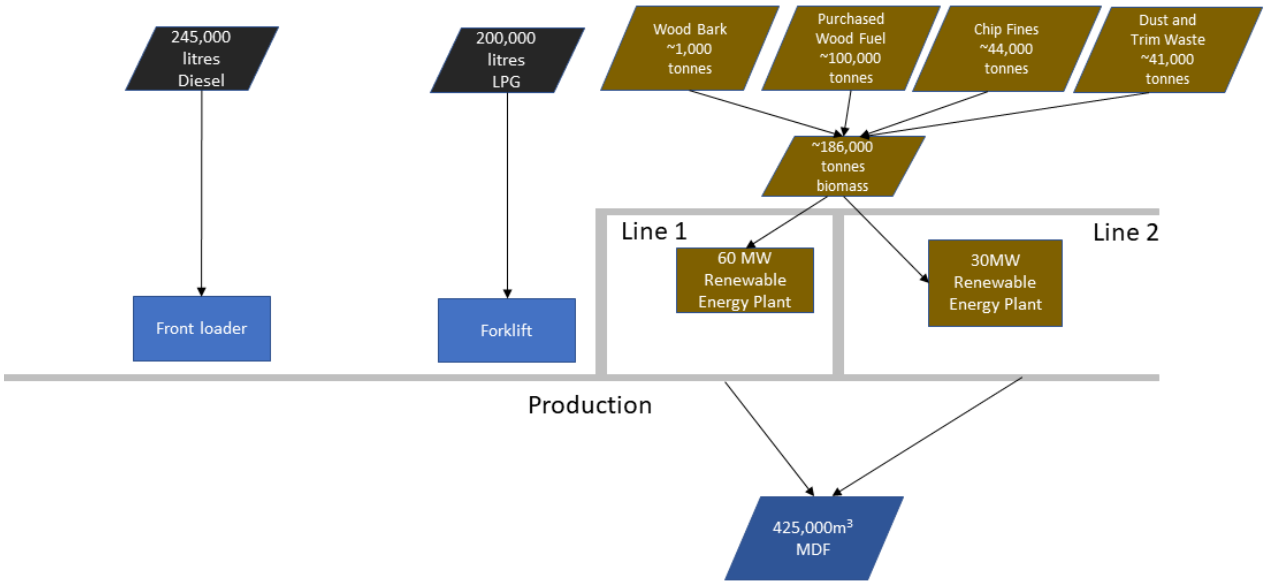


Figure 9-3 Proposed Development Approximate Fuel Use



Scope of Work

9.8 The chapter is presented in two parts:

- Part A assesses the likely effects of the Proposed Development on the Climate through an assessment of the Proposed Development's whole life Greenhouse Gases (GHG). Part A also determines its significance in the context of local and national climate policy.
- Part B considers the resilience of the Proposed Development to future changes in climate.

9.9 Mitigation measures have been identified to avoid, prevent, reduce, or offset any likely significant adverse effects and/or enhance likely beneficial effects. The nature and significance of the likely residual effects are assessed and reported.

9.10 Potential for significant effects associated with the combined impacts of the Proposed Development and climate change on environmental receptors have been considered within this analysis and assessment.

Appendix 9.1 provides details for the whole life cycle of GHG emissions for the Proposed Development.

Statement of Authority

9.11 This chapter has been supported and reviewed by Nicola Herschell PIEMA, BSc, MSc. Nicola is a Technical Director in SLR's Carbon & Energy Management team within the ESG Strategic Advisory technical discipline. Nicola has over 13 years professional experience, with 7 years in her current role at SLR, where she manages a team of consultants. Nicola has worked with a wide variety of large, high profile, multi-site organisations to help manage their reporting requirements and to ensure both Group and site-level compliance with the full suite of carbon and energy legislation, with particular specialism in the EU/UK Emissions Trading Scheme, GHG permitting, Climate Change Agreements, Climate disclosures, Streamlined Energy & Carbon Reporting, and the GHG Protocol. Nicola has supported companies across a range of industry sectors including manufacturing, infrastructure, food & drink, chemicals, pharmaceuticals, data centres, cold storage, distribution, and private equity. Nicola also helps organisations with the calculation and reporting of their greenhouse gas emissions, assessment of climate risks and opportunities to their business, and works with them to set targets and understand the strategies and opportunities to reduce their footprints and progress towards Net Zero. Nicola holds a first-class honours BSc in Geography, an MSc in Environmental Management and Sustainable Development and is a Practitioner member of the Institute of Environmental Management and Assessment.

9.12 This chapter has been prepared by Luke Moseley BSc, PG Cert. Luke is a Senior Consultant in SLR's Carbon & Energy Management team within the ESG Strategic Advisory technical discipline. Luke has 5 years professional experience and has been responsible for the delivery and Project Management of Scope 1, 2 and 3 greenhouse gas emissions and energy calculations, with the creation of GHG inventories across a variety of projects and clients. Luke has 3 years' experience in emission monitoring across a variety of industrial sites, including energy from biomass such as the Holbrook biomass plant in Sheffield UK. Luke's academic research for his MSc has a focus on biogenic and land-related emissions, with a specialism in legislation and guidance to support companies in this area. Luke holds a BSc in Environmental Science, a PG Cert in Environmental Management and is a member of the Institute of Environmental Management and Assessment.

Consultations / Consultees

9.13 While preparing this Environmental Impact Assessment Report, a pre-planning consultation meeting was held with all the appropriate agencies.

Limitations / Difficulties Encountered

9.14 This assessment is compiled based on published national, regional and local data, guidance documents. No difficulties were encountered in compiling the required information.

9.15 It was necessary to make several assumptions when carrying out the GHG assessment, although assumptions made generally sought to reflect a conservative worst-case scenario.

Relevant Terminology

Greenhouse Gas Emissions

9.16 Carbon Dioxide (CO_2), along with other gases such as Nitrous Oxide (N_2O) and Methane (CH_4) absorb and trap infrared radiation, creating a 'greenhouse' effect. Collectively these gases are known as greenhouse gases (GHG) and emissions are commonly expressed as CO_2 equivalent (CO_2e). These GHGs contribute to rising global temperatures.

9.17 CO_2 equivalent accounts for the different global warming potential of greenhouse gasses normalised to CO_2. These are based on the IPCC assessment reports for the 100-year time horizon[1].

9.18 The GHG Protocol first introduced the terms Scope 1, Scope 2 and Scope 3 as a way of categorising the different types of GHG emissions created by an organisation in their direct operations, and in their wider value chain.[2]

9.19 Scope 1 are the direct emissions from sources that are owned or operated by the organisation. These include emissions from the combustion of natural gas and other fuels in boilers, generators, vehicles etc.

9.20 Scope 2 are the indirect emissions from the generation of purchased electricity, steam, heat or cooling.

9.21 Scope 3 emissions are those that occur because of the organisation's business activities but are not linked to emissions sources owned or operated by the organisation. They can occur upstream or downstream of the operations of the company, in the supply or value chain. Examples include transportation of goods by third party vehicles, extraction of raw materials, manufacturing of purchased goods, employee commuting, procured services and use of sold products.

Biomass Fuel

9.22 Biomass is a renewable fuel source that originates from a variety of organic sources such as solid waste products from agriculture, or in the form of wood residue, bark, logs or cut off from sawmills and log harvesting, which is often a by-product. Wood biomass can be generated from growing and harvesting wood crops directly for energy purposes or can be derived from the by-products or residues from the forestry industry or wood processing.

9.23 Biomass, if left on the forest floor, would decay, and therefore release its embodied CO_2 into the atmosphere.

9.24 CO_2 emissions from harvested wood is accounted for within the forestry sector at the point of the harvesting of the forest. This is in line with 2006 IPCC guidelines for National

[1] The Greenhouse Gas Protocol Global Warming Potential Values (2016) available at: Microsoft Word - Global-Warming-Potential-Values.docx (ghgprotocol.org) accessed December 2023

[2] The Greenhouse Gas Protocol (2004) A Corporate Accounting and Reporting Standard, Revised Edition available at: https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf accessed December 2023

Greenhouse Gas Inventories[3]. The CO_2 emissions are considered to be 'carbon neutral' where the wood harvesting complies with sustainable forestry practices and replanting takes place.

9.25 Forestry that is maintained sustainably ensures the growth of woody plants. During the growth photosynthesis extracts CO_2 from the atmosphere and stores it in the tissue of the plant. Carbon is then stored in the plant for long periods of time. This removal and 'storage' of carbon from the Earth's atmosphere is known as carbon sequestration.

9.26 Emissions resulting from the combustion of organic material are classified as 'biogenic' emissions.

9.27 When calculating biogenic CO_2e emissions from wood biomass, there are still small amounts of N_2O and CH_4 which need to be accounted for, as these are not absorbed during the growth of the tree. All direct CO_2 released during combustion are excluded from scope 1 and are out of scope in line with both the IPCC national inventory guidelines and the GHG Protocol. This is due to them already being accounted for by the wood supplier when the wood is harvested.

Renewable Energy

9.28 This is energy that is generated from a source that will not be diminished such as wind, sun, water, and sustainable biomass production. Renewable Energy is essential for increasing energy security and reducing the damage of climate change from greenhouse gas emissions.

Land Use, Land Use Change and Forestry

9.29 Land Use, Land Use Change and Forestry (LULUCF) emissions are those that arise from the management of land use, changing of land use and forestry. Changing the way land is used can alter its potential to sequester carbon. For example, this could be the change of woodland to grassland or vice versa. Some land use changes will have potential beneficial impacts on the environment and climate.

[3] IPCC (2006) Guidelines for National Greenhouse Gas Inventories

REGULATORY BACKGROUND

Legislation context

9.30 The following legislation is relevant to the Proposed Development:

- European Climate Law (EU/2021/1119)[4];
- Directive 2003/87/EC (EU) Emissions Trading Scheme (as amended) (EU/2023/959)[5];
- European Union (EU) Environmental Impact Assessment (EIA) Directive (2011/92/EU as amended by 2014/52/EU)[6];
- The Climate Action and Low Carbon Development Acts 2015-2021
- Department of the Environment, Climate and Communications, Climate Action Plan 2024 (2023) [7];
- Ireland's draft updated National Energy & Climate Plan (NECP) 2021-2030[8]
- Department of the Environment, Climate and Communications, Carbon Budget (2021) [9];
- Best Available Techniques (BAT) Reference Document for the Production of Wood-Based Panels (2016)[10];

[4] Regulation (EU) 2021/1119 of 30 June 2021 Establishing the Framework for Achieving Climate Neutrality and Amending Regulation (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law') [2021] L243/1

[5]Directive (EU) 2023/959 of 10 May 2023 Amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the Establishment and Operation of a Market Stability Reserve for the Union Greenhouse Gas Emission Trading System [2023] L130/134

[6] Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification) Text with EEA relevance [2011] L26/1

[7]Department of the Environment, Climate and Communications, (2023). Climate Action Plan 2024. Available at: https://www.gov.ie/en/publication/79659-climate-action-plan-2024/ Accessed: January 2024

[8] Department of the Environment, Climate and Communications, (2023) Ireland's Draft Updated NECP 2021-2023 Available at: https://www.gov.ie/en/publication/1d2c1-irelands-draft-updated-necp-2021-2030/ Accessed: January 2024

[9]Department of the Environment, Climate and Communications, (2021). Carbon Budget Technical Report. Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/222806/dbbbd202-faab-485f-a370-253e944e461e.pdf#page=null Accessed: November 2023

[10] Joint Research Centre, Institute for Prospective Technological Studies, Karlis, P., Roudier, S., Raunkjær Stubdrup, K. et al. (2016) Best available techniques (BAT) reference document for the production of wood-based panels : industrial emissions Directive 2010/75/EU : integrated pollution prevention and control. Publications Office. https://data.europa.eu/doi/10.2791/21807

- Revised Renewable Energy Directive (EU/2023/2413) [11]

Renewable Energy Directive

9.31 The Renewable Energy Directive (RED) (2009/28/EC) was the first iteration that outlines responsibility for the governance of biofuels and bioliquids in the EU. For a biofuel or bioliquid to be classified as sustainable in the EU, it must meet the sustainability criteria set out in the RED and comply with the verification requirements.

9.32 Revised Renewable Energy Directive II (2018/2001/EU) is an extension of the RED for the periods 2021 to 2030. It introduced mandatory criteria for solid and gaseous biomass. This includes three overarching sustainability criteria which relate to land for agricultural biomass, management of forest biomass, and GHG emission savings for all biomass fuels used in installations producing electricity, heating and or cooling. Those with a total rated thermal input capacity >=20 MW in the case of solid biomass, were required to comply and Member States are required to independently verify if the sustainable requirements for the biomass count towards national obligations. However, this only applied to new installations starting from 1st January 2021.

9.33 Revised Renewable Energy Directive III (EU/2023/2413) extends the criteria of the Renewable Energy Directive to all installations with a total rated thermal input capacity >= 7.5MW including existing installations.

9.34 The RED III will apply the following changes to existing installations from at the earliest January 1st 2026 and the latest December 31st 2029:

- Apply existing sustainability and greenhouse gas saving criteria to electricity, heating and cooling production from biomass fuels used in existing installations, as opposed to only new installations.
- Apply existing sustainability and greenhouse gas saving criteria to electricity, heating and cooling production from biomass fuels used in installations over 7.5 MWth.
- Apply requirements on the cascading use of biomass to ensure woody biomass is used in the following orders; wood-based products, extended life, re-use, recycling, bioenergy and disposal.
- Strengthening of sustainability criteria (e.g. no-go areas) for forest biomass including primary, highly diverse forests and peatlands.
- Further elements included to minimise negative impact of harvesting on soil quality and biodiversity

9.35 The sustainability criteria states that biomass fuels produced from forest biomass shall be from a country of origin that has harvesting laws, monitoring, and enforcing systems. All biomass fuels used for electricity, heating and cooling shall achieve at least an 80% GHG emissions savings, when compared with its fossil fuel alternative. The RED III has requirements for information to be collected along the supply chain to allow for independent verification of the GHG emissions and sustainability to be submitted to the Member State.

[11] Directive (EC) 2023/2413 of 18 October 2023 Amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, repealing Council Directive (EU) 2015/652 [2023]

There are additional requirements for Member States to endeavour to increase the penetration of renewable energy in the heating and cooling sector.

9.36 The Proposed Development uses biomass fuels for the generation of heating and would meet the emissions savings of at least 80% when compared with its fossil fuel alternative of natural gas. The current emission factor for natural gas in Ireland is 56.357 tCO2e/TJ[12]. The comparative default factor for woodchips from forest residue sourced from 1 to 500km being 6 tCO2e/TJ, this is a GHG saving of 89%. The default factor for 500 to 2,500km is 9 tCO2e/TJ with a saving 84%.

European Union Emissions Trading Scheme

9.37 The existing Medite plant has >20MW thermal input of combustion equipment and is therefore captured by the compliance requirements of the EU ETS and is required to hold the appropriate GHG permit. For annual compliance, the site must calculate its annual energy and emissions from combustible fuels (including reporting on emissions from biomass) and surrender adequate EU allowances (EUA) to cover these emissions. The EU allocate the site a certain amount of 'free allowances' each year, which is influenced by historical activity levels, amount of measurable heat produced and the fact that they operate in an industry at risk of carbon leakage (the risk of businesses moving their operations overseas to avoid increasing costs relating to climate policies and regulations).

9.38 For EU ETS purposes, the biomass reported by Medite is 'zero rated' for carbon (as it meets the EU ETS/RED definition of 'forestry or processing residue' and the relevant sustainability criteria, outlined in 9.39 below). Therefore, the Proposed Development would result in lower than current annual GHG emissions, due to the removal of natural gas, and subsequent replacement with a 'zero rated' carbon biomass fuel source. This would lower any potential costs to Medite from EU ETS compliance, whilst also contributing towards the overall EU reduction targets of EU ETS members.

Sourcing of Biomass

9.39 Medite only use non-commercial wood biomass for bioenergy where no other use is economically viable or environmentally appropriate.

9.40 Medite use and will continue to use industrial residue and forest residue biomass in its boilers. There will be strict adherence to the EU ETS and RED III legislation for sustainability and GHG savings criteria:

- Biomass will be sourced from locations that are legally harvested.
- Biomass will be sourced from locations designed with forest regeneration.
- Biomass will be sourced from locations complying with all appropriate nature protection and long-term harvesting practices and under licence from Department of Agriculture Food and the Marine (DAFM) or Department of Agriculture, Environment and Rural Affairs DAERA in Northern Ireland.

[12] Environmental Protection Agency, (2022) Carbon Dioxide EPA Emission Factors 2023 Available at: https://www.epa.ie/publications/licensing--permitting/climate-change/carbon-dioxide-epa-emission-factors-2023.php Accessed: 30/01/2024

- Biomass used will have life cycle emissions of less than other fossil fuel alternatives.
- Biomass used for fuel will be from the bottom of the cascading use hierarchy and as such will have no other practicable commercial or environmental use.

9.41 Medite have and will continue to source the biomass residues from forests that have been felled for other commercial purposes. No forests will be felled solely to provide biomass for Medite's heat production. None of the wood biomass for the Proposed Development will be generated from growing and harvesting wood crops directly for energy purposes. The felling of trees is therefore not a direct or an indirect effect of the Proposed Development.

9.42 Currently and on completion of the boiler replacement project, all biomass used for feedstock and the increased fuelstock is and will be felled under and in accordance with licences designed to minimise significant effects on the environment issued by the DAFM or the Forest Service of DAERA. Coillte (a major supplier) also provides evidence that supplied products are from forests which have been certified to both the FSC and PEFC standards of sustainable forestry management and stewardship.

9.43 Medite currently uses Coillte as its main supplier of biomass. Coillte is the parent company of Medite operating forests across the Republic of Ireland under licences issued by DAFM. If biomass supply was not sufficient or feasible from Coillte, Medite will obtain biomass from alternative sources that also meet the EU ETS RED III guidance for sustainability criteria of biomass. In addition to being environmentally ethical, there is also a financial incentive for Medite to ensure that biomass supplies for fuelstock are sustainably sourced, because if the biomass did not meet the prescribed sustainability criteria, it would no longer be 'zero rated' for carbon for EU ETS reporting, and Medite would therefore have to purchase EUAs to cover the associated emissions.

Planning Policy Context

National

9.44 The following is relevant to the Proposed Development:

Project Ireland 2040 National Planning Framework (2020)[13];

9.45 The National Planning Framework (NPF) has the ambition in creating a single vision, with a shared set of goals for every community across the Republic of Ireland. These goals are expressed as 10 National Strategic Outcomes.

9.46 Crucially, the National Planning Framework through **National Strategic Outcome 8**, outlines the necessity of the Transition to a Low Carbon and Climate Resilient Society. It is noted that new energy systems and transmission grids will be necessary for a more distributed, more renewables focused energy generation system along with the diversification of energy

[13] Project Ireland 2040 National Planning Framework (2020). Available at: https://www.gov.ie/en/publication/daa56-national-planning-framework-ireland-2040-our-plan-npf-2018/ Accessed: November 2023

production systems away from fossil fuels and towards greener energy such as wind, wave, solar and biomass.

9.47 This viewpoint is further reflected within National Planning Objective 54:

9.48 '*Reduce our carbon footprint by integrating climate action into the planning system in support of national targets for climate policy mitigation and adaptation objectives, as well as targets for greenhouse gas emissions reductions*.'

9.49 From the NPF Section **9.2 Resource Efficiency and Transition to a Low Carbon Economy**, is necessary in addressing the long-term causes of climate change through the affirmation of reducing greenhouse gas emissions, while adapting to its effects over the short, medium and longer terms. Along with the addition to legally binding targets agreed at EU level, it is a national objective for Ireland to transition to be a competitive low carbon economy by the year 2050.

Regional

9.50 The following is relevant to the Proposed Development:

Regional Spatial & Economic Strategy for the Southern Region[14];

9.51 The Regional Spatial and Economic Strategy for the Southern Region (RSES) primarily aims to support the delivery of the programme for change set out in Project Ireland 2040, the National Planning Framework (NPF) and the National Development Plan 2018-27 (NDP). As the regional tier of the national planning process, it will ensure coordination between the City and County Development Plans (CCDP) and Local Enterprise and Community Plans (LECP) of the ten local authorities in the Region. Combined with this, the RSES supports measures outlined in the Climate Action Plan 2019. Supporting actions will focus on the likes of renewable energy and energy efficiency.

9.52 The importance of a low carbon circular economy is noted within the RSES and the transition to a low carbon future will see entire sectors of the economy undergo radical changes and create new types of enterprises and jobs. It is referenced that the Region has enormous potential for renewable energy as well as becoming a global leader in bioeconomy. This will require investment in new skills, as well as appropriate assistance and incentives to enable enterprises to make the transition.

9.53 It is stated that the RSES is committed to the implementation of the Government's policy under Ireland's Transition to a Low Carbon Energy Future 2015-30 and Climate Action Plan 2019 (now 2024). Furthermore, it is an objective to promote change across business, public and residential sectors to achieve reduced GHG emissions in accordance with current and future national targets, improve energy efficiency and increase the use of renewable energy sources across the key sectors of electricity supply, heating, transport and agriculture.

9.54 It is an objective to support the preparation of a Bioenergy Implementation Plan for the Southern Region in conjunction with the Local Authorities and the Regional Waste Management office.

[14] Regional Spatial & Economic Strategy for the Southern Region (2020). Available at: https://www.southernassembly.ie/regional-planning/rses/ Accessed: November 2023

9.55 Proposals for Bioenergy development and infrastructure will need to be subject to robust site and/or route selection that includes consideration of likely significant effects on European Sites and subject to the outcome of the required appraisal, planning and environmental assessment processes.

9.56 With respect to renewable energy, it is stated within the RSES that leadership is key to transition to renewable energy and the RSES supports the initiative by many local authorities to sign the Covenant of Mayors – a European cooperation movement involving local and regional authorities aimed at increasing energy efficiency and the use of renewable energy.

9.57 The development of research and innovation for renewable energy is evident across the Region in various initiatives such as the National Bioeconomy Hub in Lisheen, Co. Tipperary which is supported by the EU bioeconomy strategy and Horizon 2020 for the sustainable use of natural resources from traditional and non-traditional sectors. Crucially it is noted that 'Developments in this area could enable the Region to become the European Model Demonstrator Region of the Bioeconomy'.

Tipperary County Development Plan 2022-2028[15];

9.58 The Tipperary County Development Plan 2022 – 2028 states that it will guide sustainable physical, economic, and social development across Tipperary, whilst protecting the environment and guiding and supporting our move to a low-carbon society.

9.59 Within Chapter 2, **Core Strategy**, it is outlined that a prime ambition of the county is to enable a 'Just Transition' to a climate resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy along with having strategic objectives that are in compliance with the UN SDG relating to climate action.

9.60 The RSES section 3.3.2 **Tipperary as a Leader**, it is noted that the Tipperary County council became a Member of the Global Covenant of Mayors in 2015, thereby committing to CO2 emissions reduction across its services. The Covenant of Mayors for Climate & Energy is a voluntary approach for local governments to combat climate change and move towards a low emission and climate resilient society, and membership reflects commitment to climate change.

9.61 Added to this, the Council adopted a Climate Change Adaption Strategy in 2019, with consideration of risks, impacts and opportunities to Tipperary because of a changing climate, and a set of strategic measures and objectives to help build resilience across its services. The strategy notes that as an inland county, the likelihood of extreme storms and heat waves, accompanied by dry spells, will pose the greatest challenges to Tipperary.

9.62 Crucially, Tipperary forms part of the eastern and midlands Climate Action Regional Office (CARO) along with 17 other counties. The CARO supports each local authority in the region in climate action and sets out to:

- Drive climate action & build capacity within the local government sector.
- Coordinate engagement across various agencies and government departments.

[15] Tipperary County Development Plan 2022-2028 (2022) available at: https://www.tipperarycoco.ie/planning-and-building/development-plan-consultation/tipperary-county-development-plan-2022-2028 Accessed: November 2023

- Translate sectoral efforts to local level.
- Build on climate action experience & expertise.

9.63 CARO have outlined that it will contribute to Climate Mitigation and Adaptation and the achievement of GHG emission reductions targets of 7% per annum.

9.64 It is the objective of the Council to:

> ***'3 - A** Support and facilitate the implementation of European and National objectives for climate adaptation and mitigation, and to prepare a Climate Action Plan for Tipperary in compliance with the Climate Action and Low Carbon Development (Amendment) Bill (DECC, 2020) and any review thereof.'*
>
> ***'3 – B** Work in collaboration with the CARO and Southern Region Assembly in The Proposed Development and implementation of climate action initiatives.'*

9.65 It is a policy of the Council to:

> ***'3 - 1** Promote and facilitate renewable energy development, in accordance with the policies and objectives of the Tipperary Renewable Energy Strategy 2016 (and any review thereof), and the Tipperary Climate Adaptation Strategy 2019.'*

9.66 Within section 1.2 **Vision for Renewable Energy** in the **Renewable Energy volume** of the Tipperary County Development Plan, it is noted that the Renewable Energy Strategy has been developed as a planning framework to support and underpin the Core Strategy and policies and objectives of the Tipperary County Development Plan. Its Core Aim is to ensure that the County continues to be a leader in addressing climate change through the facilitation of appropriately located renewable energy developments and through supporting energy efficiency in all sectors of the economy.

9.67 It is referenced that bioenergy is seen as one of the major resources of renewable energy that is key in addressing climate change. This is also relating to wood biomass processing, and it is noted that the Council recognises the need to support the development of biomass processing facilities to cater for demand for biomass fuel for heat users in the county.

Local

9.68 The following is relevant to the Proposed Development:

Draft Clonmel and Environs Local Area Plan 2024-2030[16];

9.69 The environmental report for the Draft Clonmel and Environs Local Area Plan 2024-2030 states there is a positive effect from bioenergy. It recognises the contribution towards renewable energy and minimisation of greenhouse gas targets whilst also providing a use for agricultural and other waste.

9.70 The plan notes potential negative effects if unmitigated from the following:

- Impact upon designated and non-designated biodiversity and flora and fauna arising from vegetation change.
- Potential impacts to soil structure.

[16] Draft Clonmel and Environs Local Area Plan 2024-2030 (2023) available at: https://consultations.tipperarycoco.ie/sites/default/files/2023-07/Clonmel%20Local%20Area%20Plan%202024%20Written%20Statement.pdf Accessed: November 2023

- Fuels derived from biomass still produce emissions however these are less than those derived from fossil fuels.
- Changes to the land cover of areas could occur.

Guidance

9.71 The following guidance is relevant to the Proposed Development:

- Institute of Environmental Management and Assessment (IEMA) Guidance on Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022)[17];
- Institute of Environmental Management and Assessment (IEMA) EIA Guide to: Climate Change Resilience and Adaption (2020)[18];
- The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard (GHG Protocol) (2021)[19];
- Publicly Available Standard (PAS) 2080:2023 – Carbon Management in Buildings and Infrastructure [20];
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022) [21];
- Royal Institution of Chartered Surveyors (RICS): Whole Life Carbon Assessment for the Built Environment, 2nd edition (2023) [22]

[17] IEMA, (2022). Assessing Greenhouse Gas Emissions and Evaluating their Significance. 2nd Edition

[18] IEMA, (2020). EIA Guide to: Climate Change Resilience and Adaption

[19] World Resources Institute, World Business Council for Sustainable Development, (2001). The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard. World Resource Institute, Revised Edition.

[20] Various, (2023). Publicly Available Standard (PAS) 2080 Carbon Management in Buildings and Infrastructure.

[21] Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022) available at: https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf Accessed: November 2023

[22] RICS (2023). Whole Life Carbon Assessment for the built Environment. 2nd edition.

RECEIVING ENVIRONMENT

Study Area

9.72 The site is situated in predominantly peri-urban area, located approximately 4 km east of the centre of Clonmel town and approximately 0.9km North of the N24 road. The area to the North of the site is largely rural or agricultural in nature with low density of housing development. The area to the South is characterised by built development including the Bulmers manufacturing facility.

9.73 The site is accessed through a local road that connects to the N24. The subject site is well screened and the existing buildings within the industrial facility are situated 50m back from the local access roads and are largely obscured from view due to the presence of abundant shrub and tree plantations at the site boundaries.

Carbon Budgets[23]

9.74 Irelands first carbon budget has been approved by the government and adopted by both houses of the Oireachtas. A carbon budget represents the total amount of emissions, measured in tonnes of CO2 equivalent, that may be emitted by a country during a specific time. The carbon budget programme comprises of three 5-year budgets.

9.75 The carbon budget for Ireland are as follows:

- 2021-2025: 295 Mt CO_2e
- 2026-2030: 200 Mt CO_2e
- 2031-2035: 151 Mt CO_2e

9.76 Following the approval of the carbon budgets, Ireland agreed on Sectoral Emission Ceilings[24]. These emission ceilings refer to the total amount of permitted greenhouse gas emissions that each sector of the economy can produce during a specific time period.

9.77 The sectoral emissions ceilings for industry are as follows:

- 2021-2025: 30 Mt CO_2e
- 2026-2030: 24 Mt CO_2e

[23] DECC (2022) Carbon Budgets available at: https://www.gov.ie/en/publication/9af1b-carbon-budgets/ accessed: December 2023

[24] DECC (2022) Sectoral Emissions Ceilings available at: https://www.gov.ie/en/publication/76864-sectoral-emissions-ceilings/ accessed: December 2023

IMPACT ASSESSMENT PART A: GREENHOUSE GAS ASSESSMENT

Evaluation Methodology

Study Area and Scope

9.78 The most abundant GHG of concern is Carbon Dioxide (CO_2) which is emitted from combustion sources. Other GHGs contribute to climate change and are accounted for based on their Global Warming Potential (GWP). The combined effect of these will be presented as Carbon Dioxide equivalent (CO_2e) this will account for all GHGs included in the United Nations Framework convention on Climate Change's (UNFCCC) Kyoto Protocol[25], specifically: Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) Sulphur Hexafluoride (SF_6), and Nitrogen Trifluoride (NF_3).

9.79 The scope of the assessment was defined by:

- Geographic Scope;
- Temporal Scope;
- Activities contributing to GHG emissions.

Geographic Scope

9.80 GHGs contribute to climate change, which is a global environmental effect and as such the study area for the climatic assessment is not limited by a specific geographical scope or defined by specific sensitive receptors.

9.81 The geographic scope was determined by identifying emission sources associated with the Proposed Development in respect of which the applicant has the ability to influence or control, in line with IEMA guidance[26].

Temporal Scope

9.82 The temporal scope was consistent with assessing the whole lifecycle GHG emissions from the Proposed Development in line with the Royal Institution of Chartered Surveyors (RICS') Whole life carbon assessment for the built environment guidance[27].

9.83 The demolition and construction, operational and decommissioning phases of the Proposed Development were considered as follows:

[25] United Nations Framework Convention on Climate Change (UNFCCC) (1997) Kyoto Protocol to the United Nations Framework Convention on Climate Change FCCC/CP/1997/L.7/Add.1

[26] IEMA, (2022). Assessing Greenhouse Gas Emissions and Evaluating their Significance. 2nd Edition

[27] RICS (2023). Whole Life Carbon Assessment for the built Environment. 2nd edition. Available at: Whole life carbon assessment (WLCA) for the built environment (rics.org) Accessed: December 2023

- **Construction Phase**: Direct and indirect GHG emissions resulting from the Proposed Development over the construction period, for all relevant activities detailed in Table 9-1. The construction period is assumed to start 2025 (pending approval) with construction expected to be completed in 2035. For the purposes of this assessment the modelling of related activities is based on current day emission factors which will ensure a worst-case assessment, in order to estimate the biggest potential impacts.
- **Operational Phase**: Direct and indirect GHG emissions resulting from the operation of the completed development is assumed to start 2035, which will be used as the assessment year. GHG emissions in the assessment year are worst case as they represent the highest annual GHG emissions for the Proposed Development over its lifetime. This is due to the economy decarbonising over time, consistent with meeting the country's climate change target to be Net Zero by 2050. The Climate Action and Low Carbon Development Acts 2015-2021 is in place to support Ireland's commitment to the transition to Net Zero by 2050.
- **Decommissioning Phase**: Direct and indirect GHG emissions resulting from the decommissioning of the Proposed Development at the end of its life including demolition of buildings, transport of waste, processing of waste and disposal. This will use current day emission factors which will present a worst-case assessment.

9.84 The whole life emissions are considered from the commencement of demolition and construction phase over the 30-year lifespan of the Proposed Development.

Activities Contributing to GHG Emissions

9.85 Table 9-1 details activities included in the assessment covering the demolition and construction, operational and decommissioning phases of the Proposed Development. It is consistent with the life stages adopted by the Royal Institution of Chartered Surveyors (RICS). Table 9-1 splits out activities included in the Assessment by the Construction (A1-A5), Operational (B1-B8) and Decommissioning (C1-C4) phases. Table 9-1 also includes emissions from transport during operations which is not covered by RICS but is relevant to this assessment, so the calculations go above and beyond the guidance.

Table 9-1: GHG Activities Included in the Assessment

Development Phase	RICS Stage Identifier	Stage Name	Description
Construction Phase	• A1 Raw Material Supply • A2 Transport • A3 Manufacturing	Product Stage	Emissions from the extraction, transportation, and manufacturing processes to produce construction products and components required.
	• A4 Transport • A5 Construction and Installation	Construction	Transportation of construction products and all construction processes, including wastage.

Development Phase	RICS Stage Identifier	Stage Name	Description
			A5 also includes demolition or strip-out prior to construction.
Operational Phase	• B1 Use	In Use	Direct emissions and removals from blowing agents, refrigerant leakage or removals from CO_2 through carbonation of concrete.
	• B2 Maintenance • B3 Repair • B4 Replacement • B5 Refurbishment	In Use	Emissions associated with energy and product for maintenance.
	• B6 Operational Energy Use	Operational Carbon	Emissions associated with the operation of the Proposed Development through the operations of its technical systems over the lifetime.
	• B7 Operational Water Use	Operational Carbon	Emissions associated with the water use during the operation of the Proposed Development over its lifetime.
	• B8 User Activities not covered in B1-B7 *(Optional)*	User Carbon	Activities not included elsewhere. For example, emissions from vehicle use.
Decommissioning	• C1 Deconstruction and Demolition • C2 Transport • C3 Waste Processing • C4 Disposal	Decommissioning	Emissions associated with the end of life of the product including the deconstruction, waste processing, recovery or disposal and associated transport.

9.86 A small number of activities were scoped out:

- **Operational Phase**: GHG emissions from the following are scoped out as they are to remain the same for the Proposed Development as current working practices:
    - B1 Use

- B2 Maintenance
- B3 Repair
- B4 Replacement
- B5 Refurbishment
- B7 Operational Water Use

9.87 The following activities have been analysed and assessed:

- **Construction Phase**: All GHG emissions from the construction phase have been included in the assessment. It is expected that the alternative to the project will have similar embodied carbon emissions due to the requirement to replace existing boilers.
- **Decommissioning**: All GHG emissions from decommissioning have been included in the assessment. By the end of life of the Proposed Development it is expected that transportation, waste, and processing will have decarbonised in line with Ireland's Net Zero Climate Action Plan.

9.88 All other relevant emissions from the import of fuel stock from Coillte forests have been included under lifecycle stage B8. This is because the majority of fuel stock for the Proposed Development is supplied directly through Coillte forest residues or indirectly through process residues initially supplied by Coillte such as residues from sawmills. This supply chain has been illustrated in Figure 9.1.

Baseline Conditions

9.89 For establishing baseline GHG emissions the following relevant activities were identified:

- Operational Energy Use
- Operational Transportation

9.90 To calculate baseline Operational Energy Use, the following information from 2021 was used:

- Diesel – Litres
- LPG – Litres
- Natural Gas – MWh
- Electricity – kWh
- Biomass – Tonnes

9.91 To calculate baseline Operational Transportation, the following information from 2021 was used:

- HGV (Raw Material Deliveries) – No. of vehicles (provided by the Transport Chapter).

9.92 To ensure a worst-case assessment in line with RICS guidance, any embodied GHG emission in materials present in the current operations are ignored so that any embodied emissions present in the current operations do not overshadow any emissions of the Proposed Development. This would ensure the comparison of the construction phase emissions to an embodied carbon of 0 tCO_2e in the current operations.

Baseline & Future GHG Emissions from Energy Use

9.93 The baseline energy was first established by multiplying fuel volumes provided by the client by the relevant energy conversion factor. The GHG emissions were then calculated by multiplying energy consumption or fuel volumes provided with emission factors. The factors used are published by the UK Government[28] and the Sustainable Energy Authority of Ireland (SEAI)[29].

9.94 The future baseline GHG emissions is a projection of the potential future emissions from a Development. This is calculated to show a potential worst-case scenario in line with the government's decarbonization plans.

9.95 The future baseline GHG emissions from electricity were calculated using a stepped change assuming Net Zero emissions by 2050 in line with the strategy for Climate Action Plan. Other fuel emission factors do not change materially from year to year and therefore are not projected to improve in the future and assumed to stay the same as existing. For the current operations business as usual scenario we have assumed continued use of natural gas on site beyond 2050.

Baseline & Future GHG Emissions from Transportation of Raw Materials

9.96 Existing and future baseline transport emissions from transportation of raw materials were estimated using the number of Heavy Goods Vehicle (HGV) raw material delivery vehicles from the Transport Chapter, assuming a worst-case one-way journey distance of 350km to cover the maximum extent of the island of Ireland. GHG emissions were calculated by multiplying total distance travelled by mode of transport in line with the UK Department of Environment, Food and Rural Affairs (DEFRA) emission factors. DEFRA emission factors were selected due to the availability of relevant factors as these have not been published in Ireland to the equivalent level of granularity for modes of transportation.

9.97 In the future baseline the DEFRA GHG emission factors were adjusted assuming decarbonisation of vehicles by 2050 in line with the Climate Action Plan to account for anticipated decarbonisation of surface transport.

Construction Phase

9.98 The quantities of construction materials were provided by Medite. These were then multiplied by embodied carbon emission factors from the Inventory of Carbon and Energy (ICE) Database (2019)[30] which include the carbon emissions from energy consumed during extraction, refining, processing, transportation and fabrication of product. The factors cover the Construction life cycle stages A1-A3 (Raw Materials, Transport and Manufacturing of the

[28] Department for Environment, Food and Rural Affairs (DEFRA) (2022). UK Government GHG Conversion Factors for Company Reporting,2022. Available at: Greenhouse gas reporting: conversion factors 2022 - GOV.UK (www.gov.uk) Accessed: March 2023

[29] Sustainable Energy Authority of Ireland (SEAI), (2023). SEAI Conversion and Emission Factors 2022. Available at: https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/ Accessed: November 2023

[30] Circular Ecology (2019) ICE Database V3 available at: https://circularecology.com/embodied-carbon-footprint-database.html accessed: December 2023

Product stage). Stage A4 (Transport for the Construction stage) was calculated based on the RICS methodology using DEFRA factors for transportation distance of an average laden HGV. A5 (Construction and Installation of the Construction phase) was calculated based on RICS 2023 assumptions[31] for energy use by square meter for the pre-construction and construction activities.

Operational Phase

9.99 The assessment of operational effects of the completed development adopted the following approaches:

- The Proposed Development's GHG emissions from operational transportation emissions of raw materials in the assessment year were calculated using UK government published GHG emission factors and expected vehicle movements from the traffic and transport chapter. Whole life transportation emissions of raw materials were modelled based on published strategies for decarbonisation of the grid and transport modes reflecting the Republic of Ireland's climate change policy and strategies.
- GHG emissions associated with water consumption and the repair/maintenance of the building during its lifetime were not calculated as these will remain the same as the current Development.

9.100 GHG emissions from operational energy consumption in the assessment year were based on expected maximum boiler input capacity for the Proposed Development. The whole life emissions from energy use were modelled assuming Net Zero emissions from electricity from the ROI electricity grid by 2050 in line with the strategy for Climate Action Plan. Other fuel emission factors do not change materially from year to year and therefore are not projected to improve in the future and assumed to stay the same as existing. There is potential for Natural Gas factors to reduce as the grid becomes greener but currently information is limited and this would be difficult to correct.

9.101 GHG Emissions from fuel stock provided by Coillte Forests were based on publicly available data in the most recent Coillte annual report[32] and from the Central Statistics Office[33]. This used the scope 1 and 2 data and financial statements to create an intensity factor (tCO2e/Tonne of removed wood) that could be used to calculate emissions related to Coillte Forestry and Land. The intensity factor was used to estimate total emissions for the development from the current and proposed usage of Coillte supplied fuel stock.

9.102 LULUCF have been assumed to be 0, this is due to sustainable forestry legislation in Ireland which ensures replanting of harvested wood. CO_2 sequestered during the growth cycle of forest is then emitted during harvesting, this creates an emissions and removals balance.

[31] Whole Life Carbon Assessment for the Built Environment, 2nd Edition, RICS Professional Standard (2023) available at: Whole life carbon assessment (WLCA) for the built environment (rics.org)

[32] Coillte (2023) Annual Report 2022 Available at: https://www.coillte.ie/wp-content/uploads/2023/07/Coillte-Annual-Report-2022.pdf accessed: January 2024

[33] Central Statistics Office, (2023) Forest Wood Removals 2022 available at: https://www.cso.ie/en/releasesandpublications/ep/p-fwr/forestwoodremovals2022/ accessed: January 2024

Decommissioning

9.103 The GHG emissions from the decommissioning of the Proposed Development were assessed following the assumptions for end-of-life default routes for materials and default scenario assumptions available in RICS 2023. These assumptions have been based on a worst-case scenario of business-as-usual, with minimal attempt at deconstruction and recovery, in order to estimate the maximum potential emissions associated with the Decommissioning phase, rather than have these emissions underestimated.

Whole Life Cycle Assessment

9.104 The net change in GHG emissions from the Proposed Development were calculated by comparison to the future baseline emissions and is presented for:

- The construction phase.
- The completed development in the assessment year.
- The decommissioning phase.
- Over the whole life of the Proposed Development.

9.105 The assessment also presents the GHG mitigation being proposed, which follows the principles of the IEMA GHG management hierarchy (avoid, reduce, offset) to minimise, as far as reasonably practicable the anticipated GHG emissions over the Proposed Development's lifecycle.

Determining Likely Significant Effects and Effect Significance

9.106 The assessment considered the whole life GHG emissions of the Proposed Development. This included GHG emissions during the demolition and construction phase, operational phase and decommissioning phase.

9.107 For GHG emissions there are no recognised significance criteria and thresholds that relate to the quantity of GHG emissions released.

9.108 The approach used to classify and define likely significant effects relies on IEMA guidance for assessing greenhouse gas emissions and evaluating their significance and applies professional judgement on the significance of the Proposed Development's lifecycle GHG emissions considering their context, compliance with policy, and mitigation measures.

9.109 The IEMA guidance defines five distinct levels of significance (see Table 9-2) which are not solely based on whether a project emits GHG emissions alone, but the degree to which the project's GHG emissions are consistent with science-based 1.5°C aligned emission trajectories towards Net Zero. For each country these are effectively defined by carbon budgets, including any sectoral pathways that are designed to achieve the country's 2050 Net Zero target.

9.110 IEMA established three underlying principles, which informed its approach to significance as follows:

- The GHG emissions from all projects will contribute to climate change, the largest interrelated cumulative environmental effect.
- The consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the Environmental Impact Assessment (EIA) Directive.

- GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project may be considered significant.

9.111 Based on these principles IEMA conclude:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative, or negligible.
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages.
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

9.112 The significance of any net change of GHG resulting from the Proposed Development has been assessed by its ability to contribute to reducing GHG emissions, consistent with a trajectory towards Net Zero by 2050.

9.113 To establish the significance of the GHG emissions from the Proposed Development, judgements were made on:

- The Proposed Development's consistency with policy requirements, since these are specific to ensure the economy decarbonises in line with the country's Net Zero target.
- The degree to which the Proposed Development has sought to mitigate its emissions.

Table 9-2 GHG Significance Criteria (Based on IEMA Guidance)

Significance Rating	Description	Criteria to Determine Significance of net GHG Emissions
Major Adverse	A project with major adverse effects is locking in emissions and does not make a meaningful contribution the country's trajectory towards Net Zero.	The project's net GHG impacts are: • Not mitigated or are only compliant with do-minimum standards set through regulation. • Do not provide further reductions required by existing local and national policy for projects of this type.
Moderate Adverse	A project with moderate adverse effects falls short of fully contributing to the country's trajectory towards Net Zero.	The project's net GHG impacts are: • Partially mitigated. • May partially meet the applicable existing and

Significance Rating	Description	Criteria to Determine Significance of net GHG Emissions
		emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type.
Minor Adverse	A project with minor adverse effects is fully in line with measures necessary to achieve the country's trajectory towards Net Zero.	The project's net GHG impacts are: • Fully consistent with applicable existing and emerging policy requirements. • In line with good practice design standards for projects of this type.
Negligible	A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards Net Zero and has minimal residual emissions.	The project's net GHG impacts are: • Reduced through measures that go well beyond existing and emerging policy. • Better than good practice design standards for projects of this type, such that radical decarbonisation or Net Zero is achieved well before 2050.
Beneficial	A project with beneficial effects substantially exceeds Net Zero requirements with a positive climate impact.	The project's net GHG impacts are: • Below zero • It causes reduction in atmospheric GHG concentrations, whether directly or indirectly compared to the without project baseline.

9.114 IEMA also advises that:

- Major adverse, moderate adverse and beneficial effects should be considered significant in the context of EIA. Negligible and minor adverse are considered not significant.
- In the case of large-scale developments, irrespective of the level of mitigation, if net GHG emissions exceed 5% of the country or devolved administration's carbon budget, then this is a level of change considered significant.

9.115 The assessment of significance is established over two steps as follows:

- **Step 1 Establish Context of GHG Emissions**: context for decision making is provided by comparing the net change in the whole life GHG emissions resulting from the Proposed Development with national and sectoral GHG emission totals and carbon budgets.
- **Step 2 Determine Significance of Effects**: Significance of effects established through applying the criteria detailed in Table 9-2 based on professional judgement. This considers the consistency of the Proposed Development with national targets to meet Net Zero targets and the robustness, timeliness and efficacy of mitigation measures proposed to avoid, reduce, and compensate GHG emissions.

Cumulative Effects

9.116 Following IEMA guidance it is known that climate change is a large, interrelated, and cumulative environmental effect and emission impacts have resulting effects that are on a global scale.

9.117 In terms of this assessment the following are therefore relevant:

- The assessment will consider the effects of the Proposed Development in the context of national and regional cumulative totals. The national totals assume that other developments also contribute to GHGs and will consider their significance.
- The geographical location of emissions has no relevance to the assessment. Therefore, the effects of the Proposed Development are independent of any local cumulative emissions.

9.118 Taking this into account, assessment of the GHG emissions of the Proposed Development in cumulation with other developments was not undertaken and the cumulative GHG effects are considered to be the same as those for the current operation.

9.119 This is consistent with IEMA Guidance which states, "Effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed".

Receptor Sensitivity

9.120 The assessment of the impact on climate change only identifies a single receptor of atmospheric concentration of GHGs. This is because all global cumulative GHG sources are relevant to the effect on climate change. The sensitivity is categorised as **high** sensitivity in line with IEMA guidance.

Baseline Study & Future Conditions

Baseline GHG Emissions from Energy

9.121 Baseline GHG emissions for the site's energy usage are summarised in Table 9-3. Table 9-4 details the emission factors used.

Table 9-3 Baseline GHG Energy and Emissions

Period	Scope 1 (TJ)	Scope 2 (TJ)	Scope 1 (tCO_2e)	Scope 2 (tCO_2e)
Calendar year 2021	1,281	394	14,964	36,353

Table 9-4 Baseline GHG Emissions Factors

Emission Source	Year	Source
Natural Gas	2023	SEAI
Gasoline/Petrol	2023	SEAI
Diesel/Gas oil	2023	SEAI
Electricity Consumption	2023	SEAI
Biomass CH_4 and N_2O	2023	DEFRA
Biomass CO_2	2023	DEFRA

9.122 Table 9-3 shows that the GHG emissions from scope 1 and scope 2 energy used is equal to 51,317 tCO_2e over the 12-month period of calendar year 2021.

Baseline GHG Emissions from Transport Activity

9.123 Baseline GHG emissions from the production and transportation of raw materials are summarised in Table 9-5.

Table 9-5 Current Baseline Transportation of Raw Materials CO_2e Emissions

Source	No. of Vehicles	Miles/Vehicle (Two Way)	Emission Factor Source	Emission Factor (kgCO2e/mile)	Emissions (tCO_2e)
HGV (Raw Material Delivery)	60,604	700	DEFRA 2023	1.45877	61,885

Baseline GHG Emissions from Coillte Forests

9.124 Baseline GHG emissions calculated from the import of biomass with connection to Coillte Forests are expected to be 575 tCO_2e per annum. Calculations have been included in Appendix 9-7.

Future Baseline

9.125 Future baseline emissions were modelled assuming the site continues to function with the same fuel mix as it does currently should the Proposed Development not occur. Table 9-6

shows the future baseline GHG by year from 2035 (the date of expected completion) to 2065 from energy consumption. The 2035 emissions are projected to be lower due to a linear carbon reduction within the national electricity grid which is predicted to occur in compliance with policies and legislation for the achievement of net zero carbon emission targets nationally.

Table 9-6 Future Baseline CO_2e Emissions from Energy Consumption by Year to 2065

Year	GHG Emissions (tCO_2e)
2035	32,246
2036	30,900
2037	29,553
2038	28,207
2039	26,861
2040	25,514
2041	24,168
2042	22,821
2043	21,475
2044	20,128
2045	18,782
2046	17,436
2047	16,089
2048	14,743
2049	13,396
2050	12,050
2051	12,050
2052	12,050
2053	12,050
2054	12,050
2055	12,050
2056	12,050
2057	12,050
2058	12,050
2059	12,050
2060	12,050
2061	12,050
2062	12,050

Year	GHG Emissions (tCO_2e)
2063	12,050
2064	12,050
2065	12,050
Total Lifetime	**535,120**

9.126 Table 9-7 from transportation of raw materials. The emissions from vehicles have been reduced linearly to 2050 in line with Ireland's net zero target and policy.

Table 9-7 Future Baseline CO_2e Emissions from Transportation of Raw Materials by Year to 2065

Year	GHG Emissions (tCO_2e)
2035	34,381
2036	32,089
2037	29,797
2038	27,505
2039	25,212
2040	22,920
2041	20,628
2042	18,336
2043	16,044
2044	13,752
2045	11,460
2046	9,168
2047	6,876
2048	4,584
2049	2,292
2050	0
2051	0
2052	0
2053	0
2054	0
2055	0
2056	0
2057	0
2058	0

Year	GHG Emissions (tCO_2e)
2059	0
2060	0
2061	0
2062	0
2063	0
2064	0
2065	0
Total Lifetime	804,507

Development Design and Management

Construction

9.127 Measures will be undertaken during the construction phase to minimise generation of GHG emissions. This includes adherence to a Construction Environmental Management Plan (CEMP) that will seek to minimise construction waste (and therefore embodied carbon), maximise energy efficiency during construction works and promote use of fuel-efficient construction plant and vehicles to minimise emissions.

9.128 Reducing GHG emissions from the construction works is focused on procurement of sustainable materials that minimise embodied GHG emissions where feasible.

9.129 As part of the construction of the Proposed Development an area of trees (0.4ha) will need to be removed. A site in the northern boundary (0.4ha) will be replanted, managed and monitored. Therefore there will be no net change in LULUCF emissions.

Completed Development

9.130 The Proposed Development has been designed to be able to use greater quantities of wetter biomass. The Proposed Development seeks to incorporate best practice to minimise energy consumption from fossil fuels.

9.131 The Proposed Development will seek to minimise travel by ensuring delivery of biomass is undertaken by fully laden vehicles.

Assessment of Effects

9.132 The climate change assessment considers the net GHG emissions resulting from the Proposed Development and is structured as follows:

- Quantification of the net GHG emissions from the Proposed Development over:
    - The Construction phase.
    - The Operational phase (Proposed Development Lifespan).
    - The Decommissioning phase.
- Assessment of the likely significant effects.

- Assessment of residual effects.

Quantification of Construction Phase GHG Emissions

9.133 The GHG emissions from the construction phase have been calculated in the whole life cycle assessment for the Proposed Development. The results have been summarised in Table 9-8.

Table 9-8 Construction Phase GHG Emissions

Source	Lifecycle Reference	Tonnes CO_2e
Construction Phase	A1 to A5	9,527

9.134 Table 9-8 shows that the GHG emissions from the Proposed Development over this phase are 9,527 tonnes CO_2e.

Quantification of Operational Phase GHG Emissions

9.135 The net operational GHG emissions from the Proposed Development are summarised in Table 9-9. The emissions from B1-B5 and B7 are out of scope as these will not change post development. These emissions are based on data from the whole life cycle assessment, energy strategy and transport emission assessment.

Table 9-9 Operational Phase GHG Emissions

Source	Lifecycle Reference	Emissions Development Case (tCO_2e)	Emissions no Development Case (tCO_2e)	Net Change
Use, Maintenance, Repair and Replacement	B1 to B5	Out of Scope	Out of Scope	Not Applicable
Operational Energy	B6	424,320	535,120	-110,800
Operational Water Use	B7	Out of Scope	Out of Scope	Not Applicable
Transport	B8	874,094	804,507	69,587
Total		**1,298,414**	**1,339,627**	**-41,213**

9.136 Table 9-9 shows that the net change of operational GHG emission in the completed year for the Proposed Development are -41,213 tonnes CO_2e.

Quantification of Operational Phase GHG Emissions from Coillte Forests

9.137 Emissions from Coillte Forests are expected to be 1,349 tCO_2e per annum at maximum capacity for the Proposed Development. This is a total difference of 774 tCO2e per annum or 23,223 tCO2e over the 30 year lifetime of the development

9.138 This is not a significant effect on the climate, as these emissions would be occurring irrespective of the Proposed Development and Medite's business activities.

9.139 There is not an increase in global or national emissions due to Coillte forestry operations associated with the Proposed Development, as Coillte will not increase harvesting for the

Proposed Development. Such emissions would be mitigated by programmatic regulation and mitigation requirements under the national Climate Action Plan 2024.

Quantification of the Decommissioning Phase GHG Emissions

9.140 The GHG emissions from the End-Of-Life phase have been calculated in the whole life cycle assessment for the Proposed Development. The results have been summarised in Table 9-10.

Table 9-10 Demolition and Construction Phase GHG Emissions

Source	Lifecycle Reference	Tonnes CO_2e
Decommissioning Phase	C1 to C4	66

9.141 Table 9-10 shows that the GHG emissions from the Proposed Development over this phase are 66 tonnes CO_2e. These estimates are based on current day emission factors and are considered highly conservative due to the projected decarbonisation of the country's economy.

Quantification of Whole Life GHG Emissions

9.142 Although the current operational equipment requires replacement, the emissions from a no development case have been assessed as 0 for the construction phase to provide a worse case comparison to the Proposed Development.

9.143 Table 9-11 details the whole life net GHG emissions from the Proposed Development. The net GHG emissions are the difference between the GHG emissions without the Proposed Development and with the Proposed Development.

Table 9-11 Net Whole Life GHG Emissions

Phase	Source	Lifecycle Reference	Emissions Development Case (tCO_2e)	Emissions no Development Case (tCO_2e)	Net Difference (tCO_2e)	% of Total Development Emissions
Construction	Construction	A1 to A5	9,527	0	9,527	2%
Operational	Use, Maintenance, Repair and Replacement	B1 to B5	Out of Scope	Out of Scope	Not Applicable	Not Applicable
	Operational Energy	B6	424,320	535,120	-110,800	32%
	Operational Water Use	B7	Out of Scope	Out Of Scope	Not Applicable	Not Applicable
	Transport	B8	874,094	804,507	69,587	67%
Decommissioning	End-Of-Life	C1 to C4	66	0	66	0%
Total		**A1 to C4, Including Transport of Fuel**	**1,308,007**	**1,339,627**	**-31,620**	**n/a**

9.144 Table 9-11 shows that the net whole life GHG emissions from the Proposed Development is calculated as 1,308,007 tonnes CO2e. The most significant source of GHG emissions is from Operational Transportation which represents 67% of the net emissions. Although it should be noted that overall net emissions are lower than the no development case.

Assessment of Effects

9.145 The assessment of the significance has been informed through IEMA guidance detailed in Table 9-2 and follows the process below.

Establishing Context

9.146 The GHG emissions from the Proposed Development are compared to national and sectoral CO_2e totals to establish context.

National

9.147 The Country has legislated a 2050 Net Zero target following recommendations and analysis completed by the government of Ireland. To meet this target the government of Ireland has set carbon budgets to define a pathway to Net Zero.

9.148 Table 9-12 summarises the current carbon budget in GHG emissions from Ireland.

9.149 There have been no published budgets for post 2035 when the Proposed Development is due to be completed but the emissions annual budgets are expected to decrease linearly towards 2050.

9.150 A projected budget has been calculated in line with a linear reduction to carbon neutral emissions in 2050 from 2030 emissions budget of at most 33.5 $MtCO_2e$. This results in a total emissions budget from 2036-2050 of 176 $MtCO_2e$.

9.151 To compare the emissions to Ireland's carbon budgets, the emissions from the operational phase were first converted to Mt on an annual basis. The total lifetime of the Proposed Development is 30 years. This leads to an annual net change from the Proposed Development of 0.043$MtCO_2e$.

Table 9-12 Net GHG from Development Operational Emissions as % of Carbon Budgets

Carbon Budget	Period	Budget Value ($MtCO_2e$)	Average per Annum ($MtCO_2e$)	Net Annual Change in GHG due to development ($MtCO_2e$)	% of Annual Carbon Budget
n/a	2036-2050	176	11.7	0.043	0.37%

9.152 Table 9-12 shows that the net annual change in operational GHG emissions (0.043 $MtCO_2e$) between 2036-2050 as a percentage of the carbon budgets is 0.37% and therefore below 5% of the total budget and not significant.

9.153 Construction related emissions will occur over a 10 year period and therefore cover budgets 1,2 and 3. Table 9-13 assesses the proportion of carbon budgets represented by the demolition and construction phase.

Table 9-13 Net GHG from Development Construction Emissions as % of Carbon Budgets

Carbon Budget	Period	Budget Value ($MtCO_2e$)	Average per Annum ($MtCO_2e$)	Net Annual Change in GHG due to development ($MtCO_2e$)	% of Annual Carbon Budget
1	2021-2025	295	59	0.000953	0.0016%
2	2026-2030	200	40	0.000953	0.0024%
3	2031-2035	151	30.2	0.000953	0.0032%

9.154 Table 9-13 shows that the net annual change in GHG emissions from construction (0.00095 Mt CO2e) as a percentage of the carbon budgets is less than 0.01% across all periods and therefore not significant.

Sectoral

9.155 The Country has legislated a 2050 Net Zero target following recommendations and analysis completed by the government of Ireland. To meet this target the government of Ireland has set sectoral carbon emissions ceilings for 2030 and to define a pathway to Net Zero.

9.156 Medite emissions are included within the industry budget for Ireland and these have been published for 2026-2030, this will be during the construction phase.

9.157 Table 9-14 summarises the net change in GHG emissions from operational emissions as a percentage of the relevant annual carbon budget for industry.

Table 9-14 Net GHG from Development Construction Emissions as % of Sectoral Carbon Budgets

Carbon Budget	Period	Budget Value ($MtCO_2e$)	Average per Annum ($MtCO_2e$)	Net Annual Change in GHG due to development ($mtCO_2e$)	% of Annual Carbon Budget
2	2026-2030	24	4.8	0.000953	0.020%

9.158 Table 9.14 shows that the net annual change in operational GHG emissions (0.00095 $MtCO_2e$) as a percentage of the carbon budgets is 0.020% and therefore not significant.

Determining Significance

9.159 Significance of effects is established through applying criteria detailed in Table 9-2. This requires judgments on:

- The consistency of the Proposed Development with national, regional, and local policies.
- The robustness, timeliness, and efficacy of mitigation to avoid, reduce and compensate GHG emissions.

Consistency with Policies

9.160 The Proposed Development complies with national, regional and local policies.

National

9.161 In terms of future emissions, the Climate Change Advisory Council (CCAC) has established a "balanced Net Zero pathway" which considers feasible and cost-effective policy and technology interventions to ensure the country can meet its new Net Zero target.

9.162 The CCAC considers that 100% of power generation by 2050 will be low carbon and forecasts all ground transportation (apart from small number of HGVs) will be electrically powered.

9.163 It is therefore reasonable to assume that energy and transport emissions relating to the Proposed Development will be decarbonised consistent with the country's Net Zero target.

9.164 The Proposed Development's use of low carbon power generation is supportive of national policies to meet Net Zero.

Regional

9.165 The RSES promotes the efficient use of bio-based waste resources as part of a broad strategy to develop a Bioenergy Implementation Plan for the Region.

Local

9.166 The Tipperary County Development plan supports new construction and development forms that use a low embodied carbon approach, and where the full life-cycle carbon, and other environmental impacts are calculated to support the lowest possible energy and CO_2 emissions. The Proposed Development will be able to ensure this by phasing out the requirements of natural gas for sustainably sourced biomass from industry residues and forest residues.

9.167 It should also be noted the council supports the sustainable development of the bioenergy sector in the county.

9.168 The Clonmel Local Area Plan 2024 states the construction process can account for a large quantum of the lifecycle carbon of a development. Therefore, the most carbon effective method of development should be used.

9.169 As such, the retrofitting of existing structures will therefore be the preferred approach to development unless it is demonstrated that retrofitting is unfeasible, or redevelopment would provide positive carbon impact through the re-design, construction and use stages of a new building, compared with retrofitting.

Summary of Effects

9.170 The assessment of significance has followed the process consistent with IEMA Guidance and is summarised in Table 9-15.

Table 9-15 Assessment of Significance

Stage	Description	Applicable Rating	Is the Effect Significant?
Construction Phase	Release of direct and indirect GHG emissions during the construction phase	Minor Adverse	Not Significant
Operational Phase	Release of direct and indirect GHG emissions during the operational phase	Negligible	Not Significant
Decommissioning Phase	Release of direct and indirect GHG emissions during the End-of-Life phase	Negligible	Not Significant

9.171 Based on Table 9-15 and with reference to IEMA's significance criteria (see Table 9-2) the assessment therefore finds that the effects are minor adverse or negligible and are assessed as not significant.

Mitigation Measures

Construction Phase

9.172 Mitigation measures adopted by the Proposed Development to minimise GHG emissions from the demolition and construction phase are inherent in the design described in the **Development Design and Management** section.

Operational Phase

9.173 Key mitigation measures adopted by the Proposed Development to minimise GHG emissions from energy consumption are inherent in the design and described in the **Development Design and Management** section.

9.174 Transportation emissions are mitigated by ensuring the use of laden vehicles where possible.

Decommissioning Phase

9.175 Key mitigation measures will be adopted by the Proposed Development to minimise GHG emissions from the end of life and are inherent in the design and described in the **Development Design and Management** section.

Mitigation Summary

9.176 Table 9-16 shows an assessment of the Proposed Development's approach to mitigation against the mitigation principles described in IEMA guidance.

Table 9-16 Development Approach to Mitigation in Accordance with IEMA Mitigation Principles

Development Phase	Mitigation Approach
Construction	Adherence to a construction environmental management plan (CEMP) that will seek to minimise construction waste, maximise energy efficiency during construction works and promote use of fuel-efficient construction plant and vehicles to minimise emissions. Focused procurement of sustainable materials that minimise embodied GHG emissions where feasible.
Operational – Energy	The Proposed Development will use renewable biomass fuel in line with the RED III, therefore all fuels will be from sustainable sources with GHG savings when compared to fossil fuel alternatives.
Operational - Transport	Use of suppliers who have sustainable transportation policies, taking account of available technology for energy efficiency and vehicle loads.
Decommissioning	Materials from the Proposed Development will be deconstructed to maximise recovery to reduce emissions from the processing of waste and follow best practices supporting the circular economy. Emissions from energy and transportation use are expected to be minimal in this phase due to the national Net Zero goals. However, the Proposed Development will ensure minimisation of emissions through fuel-efficiencies and use of technology where feasible.

Residual Effects

9.177 No additional measures are proposed and therefore the residual effects remain as minor adverse or negligible and not significant.

Cumulative Residual Effects

9.178 All cumulative developments globally will have an impact on the climate, and therefore it is not feasible to assess the cumulative residual effects.

IMPACT ASSESSMENT PART B: RESILIENCE TO CLIMATE CHANGE

Evaluation Methodology

9.179 This part of the chapter provides a qualitative assessment of the embedded mitigation and resilience of the Proposed Development to climate change. The assessment methodology considers the recommendations in the IEMA EIA guide to Climate Change Resilience and Adaption[34].

Study Area and Scope

9.180 There are two areas to assessing climate change resilience issues within EIA, which need separate treatment:

- The risks of changes in the climate to the project (i.e., the resilience or vulnerability of a project to future climate changes). A climate risk assessment has been carried out to establish likely significant effects resulting from climate change on the Proposed Development.
- The extent to which climate exacerbates the effects of the Proposed Development on the environment. This has been analysed in line with IEMA Guidance. The effects of the Proposed Development on various environmental receptors have been assessed, then these effects have been re-assessed considering climate change.

Geographical Scope

9.181 The study area for climate resilience focuses on the impact that the climate will have on the Proposed Development. The study area is therefore the footprint of the Proposed Development split into its receptors.

Temporal Scope

9.182 The Proposed Development will have a lifespan of 30 years. Climate projections from MET Éireann for the 2060s[35] have been used (Representative Concentration Pathway (RCP) 8.5 – high emissions scenario). This is the latest time horizon for which MET Eireann Projections are available and consistent with IEMA Guidance.

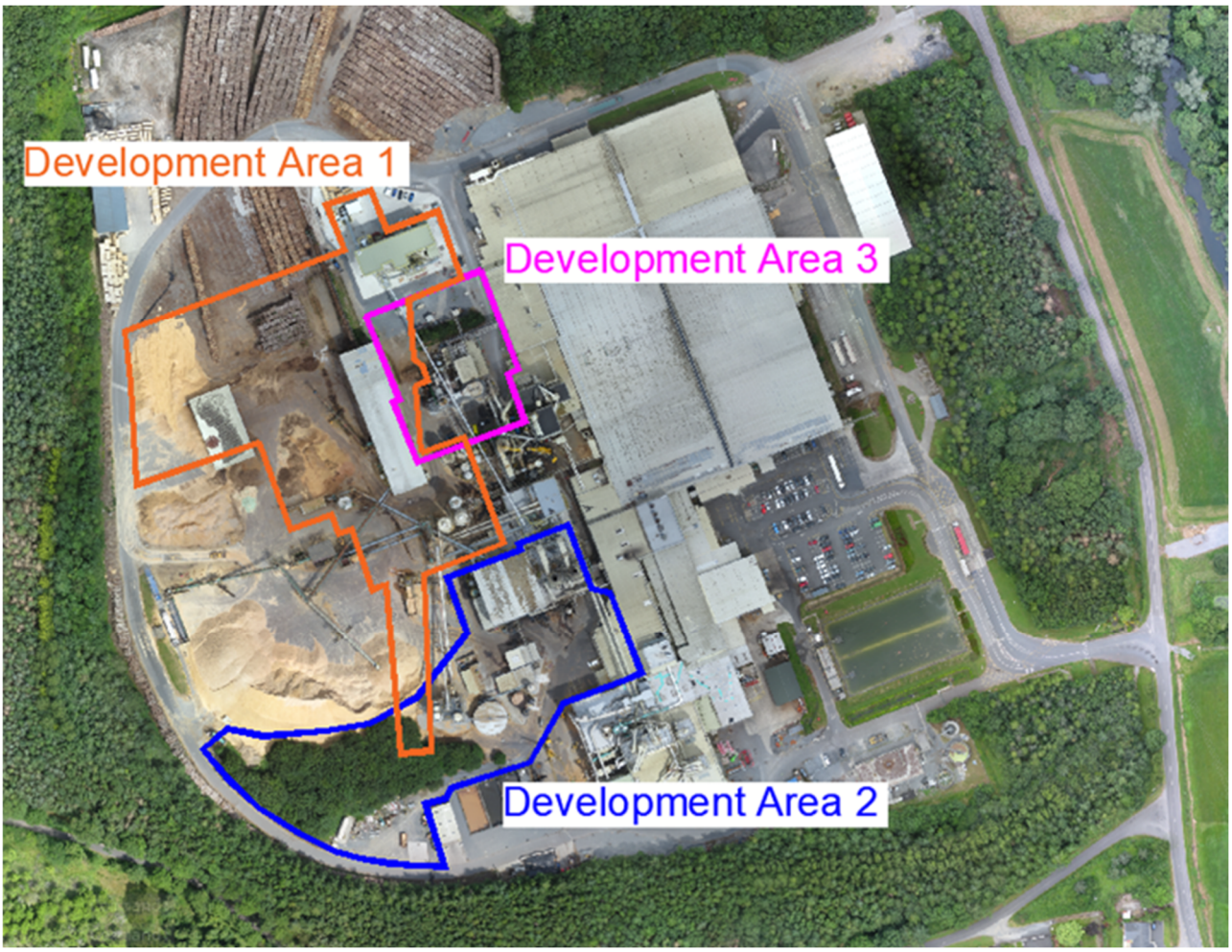
Baseline Conditions

9.183 The assessment for the Proposed Development's resilience to the impacts of climate change was informed by regional scale information on historic and projected change in climate variables, and other studies undertaken relevant to the Proposed Development.

[34] IEMA, (2020). Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation

[35] MET Éireann (2020) New Climate Projections 2020 available at: https://www.met.ie/epa-climate-projections-2020 accessed: November 2023

Figure 9-4 Map of The Proposed Development



9.184 The future climate conditions were defined by potential climate risks identified in the Government National Risk Assessment[36] and the National Adaption framework[37], Tipperary County Council Climate Change risk assessment[38].

[36] Department of Taoiseach, (2023) National Risk Assessment available at: https://www.gov.ie/en/press-release/311d3-government-publishes-national-risk-assessment-2023-outlining-top-strategic-risks-facing-ireland/ accessed: November 2023

[37] Department for Environment, Climate and Communication (DECC), (2018). Available at: https://www.gov.ie/en/publication/fbe331-national-adaptation-framework/ accessed: November 2023

[38] Tipperary County Council (2023) Climate Change Risk Assessment available at: https://www.tipperarycoco.ie/climateaction/tipperary-county-council-climate-action-plan accessed: November 2023

Identifying Likely Significant Effects

9.185 The focus of this assessment is the future when it is anticipated that changes from the existing climate will occur, and these may pose risks in relation to the operational functions of the Proposed Development and its users. The component of the assessment does not explicitly consider climate risks during the construction period as these will not be subject to additional climate change effects. The climate risks experienced in the construction are well established and managed through standard practices.

9.186 Mitigation to climate change is a function of the design which will anticipate future risks and build in appropriate adaption measures as required.

9.187 The assessment starts by establishing potential receptors, and climate risks whilst considering the significance of that risk in an assessment of likelihood and consequence accounting for embedded design measures.

9.188 The assessment identifies additional mitigation as required to address any significant effects and concludes on the residual risks.

9.189 The assessment follows IEMA guidance carried out over five-steps as follows:

Step 1: Establish Relevant Local Policy Requirements

9.190 This step establishes any relevant policy that informs the assessment of climate risks, and requirements for measures to manage these risks.

Step 2: Identify Receptors

9.191 Relevant receptors within the Proposed Development that may be affected by climate change are identified.

Step 3: Identify Potential Impacts of Climate Change and Confirm Mitigation

9.192 Identification of potential impacts of changes in a range of climate variables on the receptors identified in step 2. This is undertaken using professional judgement with reference to the climate resilience assessment and identifies the design measures to mitigate the impacts considering policy requirements from step 1.

Step 4: Assess the Significance of the Climate Change Effects

9.193 This step assesses the level of risk of each hazard as defined in Table 9-19 based on scoring the likely consequence and likelihood of that hazard arising, using a five-point scale described in Tables 9-17 and 9-18. The assessment of significance and scoring and for likelihood and significance is based on IEMA Guidance.

9.194 The assessment is qualitative and based on professional judgement and awareness of similar schemes, engagement with the wider Project Team and a review of relevant literature.

Table 9-17 Qualitative Description of Consequence

Measure of Consequence	Description
Negligible	No damage to the Proposed Development, minimal adverse effects on health, safety and the environment or financial loss. Little change to service and disruption lasting less than one day.
Minor Adverse	Localised disruption or loss of service. No permanent damage, minor restoration work required: disruption lasting less than one day. Small financial losses and/or slight adverse health or environmental effects.
Moderate Adverse	Limited damage and loss of service with damage recoverable by maintenance or minor repair. Disruption lasting more than one day but less than one week. Moderate financial losses. Adverse effects on health or the environment.
Large Adverse	Extensive damage and severe loss of service. Disruption lasting more than one week. Early renewal of 50-90% of the Proposed Development. Permanent physical injuries and/or fatalities. Major financial loss. Significant effect on the environment. Requiring remediation.
Very Large Adverse	Permanent damage and complete loss of service. Disruption lasting more than one week. Early renewal of more than 90% of the Proposed Development. Severe health effects or fatalities. Extreme financial loss. Very significant loss to the environment requiring remediation and restoration.

Table 9-18 Qualitative Description of Likelihood

Measure of Likelihood	Description
Very Low	The even may occur once during the lifetime of the Proposed Development.
Low	The event occurs occasionally times during the lifetime of the Proposed Development e.g. once every 30 years.
Medium	The event occurs limited times during the lifetime of the Proposed Development e.g., approximately once every fifteen years
High	The event occurs several times during the lifetime of the Proposed Development e.g. approximately once every five years
Very High	The event occurs multiple times during the lifetime of the Proposed Development e.g., approximately annually.

9.9.1 Events identified as High Risk (red) are considered significant effects.

Table 9-19 Significance Rating Matrix

Measure of Likelihood	Consequence of Hazard Occurring				
	Negligible	Minor Adverse	Moderate Adverse	Large Adverse	Very Large Adverse
Very High	Medium Risk	Medium Risk	High Risk	High Risk	High Risk
High	Low Risk	Medium Risk	Medium Risk	High Risk	High Risk
Medium	Low Risk	Low Risk	Medium Risk	Medium Risk	High Risk
Low	Low Risk	Low Risk	Low Risk	Medium Risk	Medium Risk
Very Low	Low Risk	Low Risk	Low Risk	Low Risk	Medium Risk

Step 5: Establish Further Adaptation Measures and Determine Residual Effects

9.195 In the fifth step, further adaption and mitigation measures for significant effects are identified through expert opinion and residual effects are then assessed from Tables 9-17 through 9-19.

Assumptions and Limitations

9.196 This assessment provides a broad indication of the potential impacts of climate change on the Proposed Development based on a qualitative assessment and professional judgement. The New Climate Projections 2020 are the most up-to-date projections of climate change for the Republic of Ireland.

9.197 The New Climate Projections 2020 provide probabilistic projections of future climate for a range of emissions scenarios. Future GHGs emissions, and resulting pathway are uncertain. A precautionary approach, consistent with IEMA Guidance has therefore been adopted by selecting a high emissions scenario (RCP8.5) and long-term time horizon (2060s) which offer the longest-term projections into the project timescale.

9.198 The determination of significance has been undertaken under the assumption that industry design standards will be adhered to where detailed design information is unavailable.

Baseline Study and Future Conditions

9.199 Table 9-20 sets out the current understanding of climate hazards within the Proposed Development, based on the assessments carried out within the Planning system and Flood Risk Management Guidelines for Planning Authorities by the Office of Public Works (OPW)[39], Ireland's

[39] Department of Housing, Local Government and Heritage (2020) available at: https://www.gov.ie/en/publication/7db50-the-planning-system-and-flood-risk-management-guidelines-for-planning-authorities-nov-09/ accessed: November 2023

Climate Averages (1991-2020) Summary Report[40], and Water Risk Atlas by the world resource institute (WRI)[41].

Table 9-20 Qualitative Description of likelihood

Climate Hazard	Current Baseline (1991-2020)
Extreme rainfall and Flood Risk	The Office of Public Works indicates that there are no documented flood events at the site of the Proposed Development. It is currently located in flood zone C (Low probability). The Met office climate data for the Proposed Development shows there have been on average 146 wet days and 23 very wet days on an annual basis in the period of 1991-2020.
Storms and Drought	The storm season runs from the 1st of September to 31st of August, with a mean average of 7 storms during the period inflicting the Republic of Ireland. The WRI water Risk Atlas currently classes the region of Clonmel as low overall water risk.
Extreme Temperatures and Urban Heat Effect	The Proposed Development is not in a region expected to be impacted by the urban heat island effect as the surrounding areas are rural which will allow waste heat to dissipate. The mean average maximum summer air temperature in the past 30 years is 18.6°C with the mean average maximum winter temperature of 8.5°C

Future Climate

9.200 For the future climate The New Climate Projection 2020 central estimate (50th percentile) projections for high emissions scenario (RCP8.5) are presented. The high emissions scenario was used as a 'worst-case' estimate of climate projections. These are summarised in Table 9-21.

[40] Department of Housing, Local Government and Heritage (2023) available at: https://www.met.ie/cms/assets/uploads/2023/09/Irelands-Climate-Averages_1991-2020.pdf accessed: November 2023

[41] World Resource Institute (WRI) Aqueduct available at: https://www.wri.org/aqueduct accessed: November 2023

Table 9-21 Climate Projections for 2040/2060s using The New Climate Projection 2020 – RCP8.5 (50th percentile)

Climate Variable [a]	2040/60s
Mean Annual Temperature (°C)	+1.6
Mean Winter Temperature (°C)	+1.2
Mean Summer Temperature (°C)	+1.7
Mean Winter Precipitation (%)	+4
Mean Summer Precipitation (%)	-19.8

[a] change relative to 1981-2000 baseline

9.201 Extreme weather events are considered for the Proposed Development. Climate change predictions indicate:

- An increase in occurrence of heat waves with the potential to experience up to 12 heat waves annually.
- A likely increase in wet days of 8% and an increase in very wet days of 19%.
- A likely increase in dry periods of 9%.

9.202 This projected changes to the climate in the Republic of Ireland have been translated in to eight priority risk areas:

- Risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards.
- Risks to soil health from increased flooding and drought.
- Risks to natural carbon stores and sequestration from multiple hazards leading to increased emissions.
- Risks to crops, livestock and commercial trees from multiple hazards.
- Risks to supply of food, goods, and vital services due to climate-related collapse of supply chains and distribution networks.
- Risks to people and the economy from climate-related collapse of supply chains and distribution networks.
- Risks to people and the economy from climate-related failure of the power system.
- Risks to human health, wellbeing, and productivity from increased exposure to heat in homes and other buildings.
- Multiple risks to the Ireland from climate change impacts overseas.

Snow

9.203 The New Climate Projection 2020, for period 2040/2060, under a high emissions scenario (RCP8.5), projections show a likely decrease of 60% relative to the 1981-2000 baseline.

Wind

9.204 The New Climate Projection 2020, for period 2040/2060, under a high emissions scenario (RCP8.5), projections show 0% change relative to the 1981-2000 baseline.

9.205 There are climate models such as Coupled Model Intercomparison Project (CMIP)[42], a project of the World Climate Research Programme (WCRP) and essential to the Intergovernmental Panel on Climate Change (IPCC) and other international and national climate assessments, that model changes to different climate variables, including wind, under different climate change scenarios into the future. It is noted that there is low model agreement within CMIP5 and its successor CMIP6 climate models regarding wind speed projections for Northwest Europe and for Great Britain, making projections of this variable uncertain. While climate projections developed by the Met Office for the UK in 2018[43] report close to 0 annual mean changes in surface wind temperatures, in global tropical storm modelling, some models indicate a decrease in frequency and many models project increases in intensities[44]. Hence, with the uncertainty of wind projections, as well as consideration for non-uniform changes in wind speeds, it is plausible that extreme wind-related events could decrease in frequency but increase in intensity.

9.206 Winds associated with major storm events can be some of the most damaging and disruptive events for Ireland with implications for property, power networks, road, rail, and air transportation.

[42] Coupled Model Intercomparison Project (2023) available at: What is CMIP? - Coupled Model Intercomparison Project (wcrp-cmip.org)

[43] UKCP18 Factsheet: Wind (2018) available at: ukcp18-fact-sheet-wind_march21.pdf (metoffice.gov.uk)

[44] IPCC (2021) Weather and climate extremes in a changing climate. Chapter 11 of AR6 Climate Change 2021: The Physical Science Basis. WGI AR6 IPCC.

Assessment of Effects

9.207 The assessment has followed the 5-step process identified earlier.

Relevant Policy Requirements

9.208 The National Adaption Framework (NAF)[45] and draft Tipperary County Council Climate Action Plan 2024-2029[46] are relevant to the assessment, this requires:

- Avoiding or minimising all sources of flood risk to and from developments, managing residual risks and where possible reducing flood risks overall considering the impacts of future climate change
- Minimising overheating and contribution to the urban heat island effect by incorporating a range of natural cooling measures as part of the design and layout, including passive design measures (e.g. building orientation, shading, planting and soft landscaping, trees, ponds, SuDS measures and other surface water features).
- Conserving water resources by maximising the flood storage role of rivers, aquifers, ponds, natural floodplains, and other surface water features; achieving high standards of water efficiency.
- Green adaption measures seeking to utilise ecological properties to enhance the benefits of naturally controlled water quality, air quality and wildlife habitats.
- Conserving and enhancing the range and ecological variability of existing wildlife habitats and species to avoid losing biodiversity in the face of future climate change.
- Taking account of the expected changes in the local climate throughout the lifetime of the Proposed Development by incorporating sufficient flexibility of design and layout to enable adaptation to future climate impacts and other changing environment, social or governance demands.

Sensitive Receptors

9.209 The key receptors identified are:

- Buildings
- Residents
- Landscaping and Biodiversity
- Site Access and Infrastructure

[45] Department of the Environment, Climate and Communications (DECC) (2018) National Adaption Framework (NAF) available at: https://www.gov.ie/en/publication/fbe331-national-adaptation-framework/ accessed: November 2023

[46] Tipperary County Council (2023) Draft Tipperary County Council Climate Action Plan 2024-2029 available at: https://consultations.tipperarycoco.ie/consultations/draft-tipperary-county-council-climate-action-plan-2024-2029 accessed: November 2023

Impacts of Climate Change

9.210 Several potential impacts were identified during the assessment of climate resilience. The results are detailed in Table 9-22.

Table 9-22 Climate Risks and Mitigation

Climate Variable	Receptor	Potential Impact
Hotter Summers Extreme Temperatures (Heatwaves)	Buildings	Overheating
		Fire
	Human Users	Reduced usability of areas due to extreme heat
		Heat Stress
	Habitats and Biodiversity	Habitats and species unable to respond to changing climatic conditions
Wetter Winters Extreme Rainfall	Buildings	Fluvial flooding
		Pluvial flooding
	Habitats and Biodiversity	Damage to habitats by pluvial water flooding
Drier Summers Drought	Buildings	Increased weathering due to thermal action
	Human Users	Risk to water supplies and resources
	Landscaping and Biodiversity	Loss of site planting and biodiversity due to drought
Wind and Storms	Buildings	Storm damage to structure
	Habitats and Biodiversity	Soil erosion, damage to trees and planting and loss of biodiversity

Significant Effects

9.211 Table 9-23 details the assessment of climate risks identified above with their risk rating and significance using the risk matrix in Table 9-19 all categories highlighted red are significant.

Table 9-23 Climate Resilience Assessment

Climate Hazard	Receptor	Potential Impact	Risk Evaluation		
			Consequence	Likelihood	Risk Rating
Hotter Summers Extreme Temperatures (Heatwaves)	Buildings	Overheating	Moderate adverse	Medium	Medium: Not Significant
		Fire	Moderate adverse	Low	Low: Not Significant
	Residents	Reduced usability of areas due to extreme heat	Moderate adverse	Medium	Medium: Not Significant
		Heat Stress	Moderate adverse	Medium	Medium: Not Significant
	Landscaping and Biodiversity	Habitats and species unable to respond to changing climatic conditions	Moderate adverse	Medium	Medium: Not Significant
Wetter Winters Extreme Rainfall	Buildings	Fluvial flooding	Moderate adverse	Low	Low: Not Significant
		Surface water flooding	Moderate adverse	Low	Low: Not Significant
	Landscaping and Biodiversity	Damage to landscaping by surface water flooding	Minor Adverse	Low	Low: Not Significant
Drier Summers Drought	Site Access and Infrastructure	Increased weathering due to thermal action	Minor Adverse	Low	Low: Not Significant
	Buildings		Minor Adverse	Low	Low: Not Significant
	Residents	Risk to water supplies and resources	Moderate adverse	Medium	Medium: Not Significant
	Landscaping and Biodiversity	Loss of site planting and biodiversity due to drought	Moderate adverse	Medium	Medium: Not Significant
Wind and Storms	Buildings	Storm damage to structure	Minor Adverse	Low	Low: Not Significant
	Landscaping and Biodiversity	Soil erosion, damage to trees and planting and loss of biodiversity	Minor Adverse	Low	Low: Not Significant

Mitigating Measures

9.212 Designed measures to mitigate impacts considering policy requirements identified under step 1 have been analysed. Table 9-24 shows a summary of these mitigating measures.

Table 9-24 Summary of Mitigating Measures

Climate Variable	Receptor	Potential Impact	Design measures to mitigate impacts
Hotter Summers Extreme Temperatures (Heatwaves)	Buildings	Overheating	The Proposed Development will be designed to consider effects of projected increases in peak summer temperatures. Appropriate insulation and ventilation of the Proposed Development will be considered at detail design stage. A design approach will be taken to limit risk of overheating and minimise the chance of fire.
		Fire	
	Human Users	Reduced usability of areas due to extreme heat	People will be provided easy access to sheltered areas away from high temperatures for respite.
		Heat Stress	Appropriate insulation and ventilation of the Proposed Development will be considered at detail design stage. Existing infrastructure on site will provide shade and respite from hotter summers.
	Habitats and Biodiversity	Habitats and species unable to respond to changing climatic conditions	Protection of existing areas of ecological value through their retention. Future management of habitats and biodiversity within the site.
Wetter Winters Extreme Rainfall	Buildings	Fluvial flooding	The site is within flood zone c and therefore has a low probability of flooding. Use of water-resistant construction materials and equipment

Climate Variable	Receptor	Potential Impact	Design measures to mitigate impacts
		Surface water flooding	The site is within flood zone c and therefore has a low probability of flooding. Surface water drainage design will be considered to allow for the potential of increased rainfall.
	Habitats and Biodiversity	Damage to habitats by surface water flooding	Protection of existing areas of ecological value through their retention. Future management of habitats and biodiversity within the site.
Drier Summers Drought	Buildings	Increased weathering due to thermal action	Details of building materials will be considered for their durability and ease of replacement and repair as required.
	Human Users	Risk to water supplies and resources	The Proposed Development will consider best practice in water efficient design to manage potable water demand.
	Landscaping and Biodiversity	Loss of site planting and biodiversity due to drought	Protection of existing areas of ecological value through their retention. Future management of habitats and biodiversity within the site.
Wind and Storms	Buildings	Storm damage to structure	Design will consider building materials and construction to ensure that the Proposed Development is resilient to extreme weather including storms and heatwaves.
	Habitats and Biodiversity	Soil erosion, damage to trees and planting and loss of biodiversity	Protection of existing areas of ecological value through their retention. Future management of habitats and biodiversity within the site.

Residual Effects

9.213 Table 9-23 shows that there are no significant effects on the Proposed Development due to future climate change.

9.214 The residual effects are in line with those described in Table 9.23 and are not significant.

Cumulative Residual Effects

9.215 All cumulative developments from the Proposed Development schedule have been considered in the identification of cumulative effects from climate change.

9.216 The vulnerability assessment considers the impacts of climate change on the Proposed Development. The changes in climate variables will be experienced by all developments in the vicinity however the impacts may alter due to cumulative developments.

9.217 Effects associated with flooding and surface water runoff because of rainfall changes may be exacerbated by cumulative developments which increase the impermeable area in the vicinity of the Proposed Development. However, chapter 7 for hydrology and hydrogeology takes account of cumulative effects so this is not assessed here.

9.218 Effects associated with higher summer temperatures and more extreme temperature events could be exacerbated by cumulative developments as a large increase in hard surface can lead to urban heat island effect. This is not likely from the development due to its peri-urban location.

9.219 Effects associated with water shortage and drought could be exacerbated by cumulative industrial developments as a large increase in water usage would affect the availability of water in the local area.

9.220 There is potential to further mitigate risks associated with climate change, these measures have been identified including:

- Tree planting will increase shade, reducing the effects of high temperatures.
- Using vegetation to stabilise soil and slopes will reduce the effects of changes in soil moisture.
- Habitat creation will slow flows and reduce flood risk because of increased rainfall and extreme rainfall events.

9.221 Specifying habitat creation and species choice to ensure planting is resilient to drier conditions and drought.

APPENDIX

Appendix 9-1 Project Level Summary

Appendix 9-2 A1-A3 Calculations

Appendix 9-3 A4 Calculations

Appendix 9-4 A5 Calculations

Appendix 9-5 C1-C4 Calculations

Appendix 9-6 Operational Energy

Appendix 9-7 Coillte Biomass Emissions

(Refer to EIAR Volume 3 for Appendices)