SWORDS BUSINESS PARK, GREENFIELDS, CO. DUBLIN

Climate Change Impact Assessment Report

Jackie Greene Construction Limited

Report no.: 1.0, Rev. 2.0
Document no.: 1.0
Date: 05/06/2026

Project name:	Proposed Large Scale Residential Development (LRD) at Greenfields, Swords Business Park, Swords, Co. Dublin	Synergy Environmental Limited T/A DNV 3D Core C, Block 71, The Plaza, Park West, Dublin 12, D12F9TN Tel: +1 503 222 5590 485440
Report title:	Climate Change Impact Assessment Report	
Customer:	Jackie Greene Construction Limited	
Date of issue:	06/05/2026	
Organisation unit:	ESG Strategy	
Report no.:	1.0, Rev. 2.0	

Applicable contract(s) governing the provision of this Report:
DNV Short Form Agreement

Objective:
Climate Change Impact Assessment Report

Prepared by:	Verified by:	Approved by:
Leah Moloney Consultant	Aoife Grogan Senior Consultant	Aoife Gillen Principal Consultant
[Name] [title]	[Name] [title]	
[Name] [title]	[Name] [title]	

Internally in DNV, the information in this document is classified as:

	Can the document be distributed internally within DNV after a specific date? No	Yes
☐ Open ☒ DNV Restricted	--	--
☐ DNV Confidential ☐ DNV Secret	☐	☐ 01/05/2026

Rev. no.	Date	Reason for issue	Prepared by	Verified by	Approved by
1	2026-04-30	Client Issue	Leah Moloney	Aoife Grogan	Aoife Gillen
2	2026-06-05	Final Issue	Leah Moloney	Aoife Grogan	Aoife Gillen

IMPORTANT NOTICE AND DISCLAIMER

1) This Report is provided to Customer on the basis of the Scope and assumptions as set out in the report.

2) DNV performs a technical assessment only. DNV specifically excludes any liability for opinions, estimates and advice herein given in relation to matters that require legal or financial expertise or any other specialized investigation.

3) Even though DNV expresses opinions, estimates and advice in the Report and DNV's other deliverables hereunder, it should not be construed as a guarantee that such opinions, estimates and advice will materialize or that certain results will be achieved, and DNV cannot be held liable if such opinions, estimates and advice do not materialize or if certain results are not achieved.

4) The Report and any other DNV deliverables hereunder are based on information and documentation provided by Customer and information available in the public domain. Where information and documentation is not available in order for DNV to carry out an adequate assessment, DNV makes reasonable assumptions based on other similar projects. Lack of information is in itself a potential risk, which is highlighted in the Report where particularly relevant. DNV will not be responsible or liable for the quality of the information and documentation that the Report and/or any other DNV deliverables are based on, nor any consequences of the use of such information in the results of the deliverables hereunder in the Report and DNV's other deliverables hereunder.

5) The contents of the Report are confidential. Neither the Report nor any of its contents: (i) may be disclosed to any person other than (a) Customer's directors, officers, employees, financiers, professional advisers, Affiliates and subsidiaries, (b) directors, officers or employees of its Affiliates. or (c) in the case of the Customer only, each fund or investment vehicle (or similar vehicle) which is managed or advised by the Customer or by the Customer's Affiliates, in each case, provided such recipients are subject to confidentiality obligations reflecting the principles herein. nor (ii) may it be referred to, quoted from or filed with any other person or party without the prior consent of DNV in writing. Affiliate means in relation to either party, any entity that, directly or indirectly, i) controls that party, ii) is controlled by that party or iii) is controlled by another entity which also controls that party, and, "control" and "controlled" means a beneficial ownership, shareholding or voting right of more than fifty percent (50%) of another entity or the legal power to direct or cause the direction of the general management of the company".

6) No persons other than Customer may rely on the Report, and the Report may not be used by, distributed to, quoted from, referred to, nor disclosed to, any person other than, Customer and its professional -advisers (a "Third Party"), whether directly or indirectly, without such Third Party first having signed and submitted to DNV a duly signed non-reliance letter in an agreed form. Such disclosure to a Third Party is further subject to (i) the prior written consent of DNV, (ii) DNV not having any liability towards such Third Party outside the scope of what will be agreed in the non-reliance letter, and (iii) the Report will be strictly confidential and will be treated as such by the Third Party.

7) DNV specifically disclaims any responsibility or liability of any nature whatsoever to any person other than Customer as regards the Report and the content thereof, irrespective of whether the Report is made available to such person with the consent of DNV or in compliance with the conditions set out above.

8) Notwithstanding the above, a lender/co-lender, financial institution, buyer or other Third Party may rely on the Report, subject to (i) the prior written consent of DNV, (ii) the Third Party having signed and submitted to DNV a duly signed reliance letter in an agreed form, (iii) DNV not having any liability towards such Third Party outside the scope of what will be agreed in the reliance letter, and (iv) the Report will be strictly confidential and will be treated as such by the Third Party.

9) Customer will indemnify, defend and hold DNV harmless for any breach of the above conditions.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

DNV has been commissioned to produce a Climate Change Impact Assessment Report (CCIA) on behalf of Jackie Greene Construction Limited for a Proposed Mix-use Residential Development on lands at Swords Business Park, Greenfield, Co. Dublin (hereafter referred to as the Proposed Development). A full project description is in included in Section 1.4 of this report.

1.1 Quality Assurance and Competency of Experts

This Change Impact Assessment (CCIA) Report has been prepared by Leah Moloney, Environmental Consultant at DNV. Leah holds a BA Hons in Ecology and Environmental Biology. Leah specialises in the areas of climate change and sustainability; and has provided technical input to a diverse range of projects in this context. Leah has considerable experience in preparing CCIAs for both commercial and residential developments in response to national and local authority requirements. She is also experienced in aligning the assessment with the EU Taxonomy Regulation to provide a thorough examination of climate-related risks and opportunities.

The quality assurance check on this CCIA has been carried out by Aoife Gillen at DNV. Aoife holds a Master of Science (Hons) degree, is a Chartered Environmental Health Practitioner, and Certified Energy Manager. Aoife has worked as a Principal Sustainability Consultant with DNV since March 2024 and has built up experience preparing Climate Change Impact Assessments, Environmental Impact Assessment (EIA) Reports, Climate Chapters, Climate Impact Statements and Carbon assessments.

1.2 Methodology

In accordance with FCC planning requirements, the Report will assess the impact of climate change on the Proposed Development and ensure that the policy objectives produced and implemented by the local authority in relation to climate change and climate change protection measures, particularly in relation to drainage design, as set out within the Fingal Development Plan 2023-2029 (FDP), have been incorporated into the Proposed Development design. The relevant policy objectives of the FDP have also been carefully considered in the context of associated UN Sustainable Development Goals (SDGs), and their incorporation into the Proposed Development design.

This assessment has been undertaken in accordance with Regulation (EU) 2020/852 of the European Parliament and of the Council (the 'Taxonomy Regulation'), Commission Delegated Regulation (EU) 2021/2139 (the 'Supplementing Regulation'), and 'Technical Annex B: Climate Change Risk Assessment' of the 'Local Authorities Climate Action Planning Guidelines' and provides a qualitative Climate Change Risk Assessment ('CCRA'). A qualitative CCRA supports the identification and prioritisation of potential future climate risks for more detailed analysis and provides a broad understanding of where adaptation actions could be required.

The physical climate risks which may affect the performance of the Proposed Development during its expected lifetime have been identified through a climate risk screening. Climate projections across the existing range of future scenarios have been examined, along with the Proposed Development location, to gain an understanding of the future risks that climate change may have

on the Proposed Development. The vulnerability of the Proposed Development to these risks has been subsequently assessed taking account of relevant adaptation and mitigation measures which have been incorporated into the Development design.

This Report provides information to support the relevant public body in carrying out its functions in a manner consistent with national climate plans and strategies (such as the National Climate Action Plan 2025) and furthering the achievement of the national climate objective as set out under Section 15 of the Climate Action and Low Carbon Development Act 2015, as amended in 2021. Under the Act each local authority is required to prepare a local authority climate action plan for its administrative area. The plans are consistent with the most recent climate action plan and national adaptation framework. The plans are to address, and integrate, mitigation of greenhouse gases, climate change adaptation and strengthened alignment with national climate policy, delivering effective local climate action. The current CCIA report should be reviewed alongside the relevant and current Local Authority Climate Action plan to ensure alignment with relevant objectives and targets.

1.3 Scope and Limitations

This report assesses the impact of climate change on the Proposed Development (physical climate risks, vulnerability and adaptation measures) following Annex II, Section 7.1 of Commission Delegated Regulation (EU) 2021/2139 as a methodological framework only. It does not assess the impact of the development on climate (i.e., embodied/operational greenhouse gas emissions). This report has not been prepared for the purpose of assessing compliance with the EU Taxonomy Regulation. Accordingly, it does not make any determination regarding 'Do No Significant Harm' or other Taxonomy criteria for environmental objectives beyond adaptation.

1.4 Project Description

The proposed development consists of a mixed-use development that constitutes a 'Large-Scale Residential Development' (LRD) at this site of 2.22 Ha principally located at Swords Business Park, Swords, Co. Dublin. The site is principally bound: to the north by an access road and ancillary car park to serve Swords Business Park; to the east by the M1 Motorway; to the south by Mantua Road; and to the west by an access road to serve Swords Business Park. The application site also extends to include parts of: the access road to the northand west for footpath, landscape and foul drainage connection works; Mantua Road to the west for foul drainage connection works; and the green strip to the south at Mantua Road for a pedestrian and cyclist connection.

Permission is sought for a mixed-use development with a gross floor area of 30,358 sq m and principally comprised in 5 No. blocks (A–E), with heights ranging from 1 No. to 9 No. storeys. The proposed block heights are as follows: Block A is 6 No. to 7 No. storeys; Block B is 6 No. to 7 No. storeys; Block C is 6 No. to 7 No. storeys; Block D is 6 No. to 9 No. storeys; and Block E is 1 No. to 9 No. storeys. The development consists of: 289 No. residential apartments (60 No. 1-bed, 200 No. 2-bed and 29 No. 3-bed); retail/commercial unit (701sq m); and crèche (418 sq m) with outdoor play area (42 sq m).

Permission is also sought for: new multi-modal site entrance to the west; minor relocation of existing northern site entrance to the east; internal road, cycle and footpath network; 132 No. car parking spaces; 13 no. motorcycle parking spaces; cycle parking; hard and soft

landscaping, including public open space, communal amenity space (at-grade and as roof gardens atop Block D and Block E) and incidental open space; private amenity space as balconies and terraces facing all directions; public lighting; bin stores; plant rooms; 2 No. sub-stations; green roofs; rooftop plant, PV panels, telecommunications infrastructure, lift overruns and automatic opening vents; and all associated works above and below ground.

1.5 Legislative and Strategic Context

1.5.1 The EU Taxonomy Framework

Regulation (EU) 2020/852 of the European Parliament and of the Council (the 'Taxonomy Regulation') establishes the criteria for determining whether an economic activity qualifies as environmentally sustainable for the purposes of establishing the degree to which an investment is environmentally sustainable. Commission Delegated Regulation (EU) 2021/2139[1] (the 'Supplementing Regulation') establishes the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives.

The technical screening criteria as outlined within the Supplementing Regulation have been adopted for the purpose of this assessment.

The Supplementing Regulation establishes the technical screening criteria specific to certain economic activities. The Proposed Development, located at Swords Business Park, Greenfield, Co. Dublin consists of the construction of a mixed-use residential development. Therefore, in accordance with Annex II, Section 7.1, of the Supplementing Regulation, the relevant technical screening criteria for the Proposed Development are set out under the "Construction of new buildings".

Annex II Section 7.1 of the Supplementing Regulation sets out the relevant technical screening criteria for the project to make a *'Substantial Contribution to Climate Change Adaptation'.* These technical screening criteria have been adopted in the current assessment to conduct a climate risk and vulnerability assessment and determine the adaptive capacity of the Proposed Development. [2]

Table 1-1 overleaf details the criteria for *"Substantial Contribution to Climate Change Adaptation"* and the associated sections of this Report in which these criteria have been addressed.

[1] Commission Delegated Regulation (EU) of 4.6.2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives.

[2] These criteria have been adopted for assessment purposes only and do not suggest that the Proposed Development qualifies as an 'environmentally sustainable' economic activity under the Taxonomy Regulation.

Table 1-1: Substantial Contribution to Climate Change Adaptation Screening Criteria

Substantial Contribution to Climate Change Adaptation Screening Criteria[3]	Relevant Section of this Report
The economic activity has implemented physical and non-physical solutions ('**adaptation solutions'**) that substantially reduce the most important physical climate risks that are material to that activity.	See Section 4 of this report for Climate Risk and Vulnerability Assessment.
The physical climate risks that are material to the activity have been identified from those listed in Appendix A to this Annex by performing a robust **climate risk and vulnerability assessment** with the following steps: a) screening of the activity to identify which physical climate risks from the list in Appendix A to this Annex may affect the performance of the economic activity during its expected lifetime; b) where the activity is assessed to be at risk from one or more of the physical climate risks listed in Appendix A to this Annex, a climate risk and vulnerability assessment to assess the materiality of the physical climate risks on the economic activity; c) an assessment of adaptation solutions that can reduce the identified physical climate risk. The climate risk and vulnerability assessment is proportionate to the scale of the activity and its expected lifespan, such that: a) for activities with an expected lifespan of less than 10 years, the assessment is performed, at least by using climate projections at the smallest appropriate scale; b) for all other activities, the assessment is performed using the highest available resolution, state-of-the-art climate projections across the existing range of future scenarios consistent with the expected lifetime of the activity, including, at least, 10 to 30 year climate projections scenarios for major investments.	See Section 2 of this report for Climate Change Projections. See Section 3 of this Report for Climate Risk Screening. See Section 4 of this report for Climate Risk and Vulnerability Assessment.
The **climate projections** and assessment of impacts are based on best practice and available guidance and take into account the state-of-the-art science for vulnerability and risk analysis and related methodologies in line with the most recent Intergovernmental Panel on Climate Change (IPCC) reports, scientific peer-reviewed publications and open source or paying models.	See Section 2 of this report for Climate Change Projections.

[3] as set out in Annex II, Section 7.1 of the Supplementing Regulation.

Substantial Contribution to Climate Change Adaptation Screening Criteria[3]	Relevant Section of this Report
The **adaptation solutions** implemented: a) do not adversely affect the adaptation efforts or the level of resilience to physical climate risks of other people, of nature, of cultural heritage, of assets and of other economic activities; b) favour nature-based solutions or rely on blue or green infrastructure to the extent possible; c) are consistent with local, sectoral, regional or national adaptation plans and strategies; d) are monitored and measured against pre-defined indicators and remedial action is considered where those indicators are not met; e) where the solution implemented is physical and consists in an activity for which technical screening criteria have been specified in this Annex, the solution complies with the do no significant harm technical screening criteria for that activity.	See Section 4 of this report for Climate Risk and Vulnerability Assessment. See Section 5 of this report for Fingal Development Plan 2023-2029: Relevant Policies and Objectives This report has not been prepared for the purposes of assessing compliance with the Taxonomy Regulation and therefore does not demonstrate compliance with the relevant criteria for Do No Significant Harm as they relate to the remaining five environmental objectives.

1.5.2 IPCC Sixth Assessment Reports (AR6)

The Intergovernmental Panel on Climate Change (IPCC) was set up in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) to assess the science related to climate change so that government organisations at all levels would have a scientific basis from which to make decisions regarding climate change. The IPCC assessments of scientific research relating to climate change is written and reviewed by leading scientists worldwide, and then reviewed by experts in their field to ensure the reports reflect the full range of views in the scientific community. The IPCC reports undergo multiple rounds of drafting and review to ensure they are comprehensive and objective and produced in an open and transparent way.

The role of the Intergovernmental Panel on Climate Change (IPCC) is to critically assess the scientific, technical and socio-economic information relevant to understanding the physical science and impacts of human-induced climate change and natural variations, including the risks, opportunities and options for adaptation and mitigation.

The most up to date IPCC report is the Sixth Assessment Report (AR6)[4], which comprises of three Working Group Reports and a Synthesis Report, three Special Reports, and a refinement to its latest Methodology Report; these are as follows:

- **The Working Group I (WGI)** contribution to the Sixth Assessment Report, *Climate Change 2021*: *The Physical Science Basis* was released on 9 August 2021.
- **The Working Group II** contribution, *Climate Change 2022: Impacts, Adaptation and Vulnerability* was released on 28 February 2022.
- **The Working Group III** contribution, C*limate Change 2022: Mitigation of Climate Change* was released on 4 April 2022.
- Special Report 1: *Global Warming of 1.5 ºC* (SR15, October 2018)
- Special Report 2: *Climate Change and Land* (SRCCL, August 2019)
- Special Report 3: *Ocean and Cryosphere in a Changing Climate* (SROCC, September 2019)
- The **AR6 Synthesis Report** integrates the three Working Group reports as well as the findings from the three cross-Working Group Special Reports prepared during this assessment cycle.

AR6 has adopted a unified framework of climate risk, supported by an increased focus in WGI on low-likelihood, high impact outcomes. Systematic risk framing is intended to aid the formulation of effective responses to the challenges posed by current and future climatic changes and to better inform risk assessment and decision-making. AR6 also makes use of the ‘storylines’ approach, which contributes to building a robust and comprehensive picture of climate information, allows for a more flexible consideration and communication of risk, and can explicitly address low-likelihood, high-impact outcomes.

[4] Intergovernmental Panel on Climate Change (2022) Sixth Assessment Report (AR6).

The climatic impact-driver (CID) framework adopted in Chapter 12 of IPCC AR6 WGI allows for assessment of changing climate conditions that are relevant for regional impacts and for risk assessment.

The scientific findings summarised here underpin the climate projections and risk assessments applied to the Proposed Development in Sections 2 and 3 of this Report.

1.5.3 Fingal County Council Planning Requirements

1.5.3.1 Fingal County Council Climate Action Plan 2024-2029

In February 2024, FCC adopted Fingal County Council Climate Action Plan 2024-2029 (CAP). The Action Plan is the climate adaptation and mitigation strategy for the County, and sets out to achieve, by no later than the end of 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral County. Aligned to the Government's National Climate Objective (as set out in the national Climate Action Plan 2024), the new Plan outlines mitigation and adaptation climate action measures across the following six thematic areas:

- Energy & Buildings;
- Transport;
- Flood Resilience;
- Nature Based Solutions;
- Circular Economy & Resource Management; and
- Community Engagement.

The actions in these themes collectively address the four targets of this plan:

1. 50% improvement in FCC's energy efficiency by 2030
2. 51% reduction in FCC's greenhouse gas emissions by 2030
3. To make Dublin a climate resilient region, by reducing the impacts of future climate change-related events; and
4. To actively engage and inform our communities on climate action.

The Plan sets out how FCC will be responsible for enhancing climate resilience, increasing energy efficiency and reducing greenhouse gas emissions across its own assets, services and infrastructure to which it is fully accountable for.

In the development of the CAP, FCC has reviewed the risks posed by climate change for the County and the implications of these risks for the delivery of services by FCC. This has been achieved through a Climate Change Risk Assessment (CCRA) which identifies the likelihood of future climate hazards and their potential impacts. The CCRA has been undertaken, in accordance with 'Technical Annex B: Climate Change Risk Assessment' of the 'Local Authorities Climate Action Planning Guidelines'.

A qualitative CCRA supports the identification and prioritisation of potential future climate risks for more detailed analysis and provides a broad understanding of where adaptation actions could be required. The approach comprises of two phases, where both current and future risks and impacts are assessed.

The risk screening methodology employed within the FCC CAP has been considered in Section 3 of this report.

1.5.3.2 Fingal Development Plan (FDP) 2023-2029

The FDP sets out the policy objectives and the overall strategy for the proper planning and sustainable development of the County over the plan period from 2023 to 2029.

Climate action is included as an overarching and cross-cutting theme across this Plan in line with International, National and Regional policies and objectives. Chapter 5 Climate Action details Fingal's position in relation to this key issue, in terms of a policy approach to the transition to a low carbon economy and to Fingal becoming climate resilient, with a strong emphasis on reduction in energy demand and emissions, through a combination of effective mitigation and adaptation responses to climate change.

The Climate Action chapter of the plan sets out detailed policy objectives in relation to climate action and the role of planning in climate change mitigation, climate change adaptation, and the transition towards a more climate resilient County. The Chapter addresses five key issues, namely:

- Energy and Buildings;
- Transport;
- Flood Resilience;
- Nature-based Solutions;
- Resource Management.

The FDP aims to build on these five key areas in line with Fingal's Climate Action Plan, and with a focus on evidence-based and spatially appropriate policies. The Plan aims to influence a reduction in carbon emissions and the negative impacts of climate change by promoting compact urban growth and sustainable transport as well as measures to minimise coastal erosion and flooding, enhance green infrastructure and biodiversity, minimise energy use, promote energy conservation and use of renewable energy sources. The Plan aims to provide for effective management of resources to ensure that FCCs carbon footprint is reduced.

The creation of a climate resilient County is an overarching strategic outcome of the FDP, and as such, the theme permeates the entire plan with a selection of policy objectives in multiple Chapters all contributing to aid in the transition of the County to a climate resilient low carbon society[5]. Relevant policy objectives and their incorporation into the Proposed Development design have been considered in Section 6 of this report.

1.5.4 Climate Action and Low Carbon Development Act

The Climate Action and Low Carbon Development Act 2015 (the principal act) set national climate policy on a statutory footing for the first time in Ireland, with the target of pursuing the transition to a low-carbon, climate-resilient, and environmentally sustainable economy by 2050. The principal act was subsequently amended by the Climate Action and Low Carbon Development (Amendment) Act 2021 (the '2021 Act') which sets Ireland on a legally binding path to net-Zero emissions no later than 2050, and to a 51% reduction in emissions by the end of this decade.

[5] Fingal County Development Plan 2023-2029.

The 2021 Act provides a legally binding framework with clear targets and commitments set in law, and ensures the necessary structures and processes are embedded on a statutory basis to ensure Ireland achieves its national, EU and international climate goals and obligations in the near and long term.

The 2021 Act also introduces a requirement for each local authority to prepare a Climate Action Plan, which will include both mitigation and adaptation measures and be updated every five years. Local authority Development Plans will also align with their Climate Action Plan.

Furthermore, Public Bodies are obliged to perform their functions in a manner which is consistent with national climate plans and strategies and furthering the achievement of the national climate objective; this is set out under Section 15 of the Climate Action and Low Carbon Development Act 2015, as amended in 2021:

"Duties of certain bodies

15. *(1) A relevant body shall, in so far as practicable, perform its functions in a manner consistent with—*

(a) the most recent approved climate action plan,

(b) the most recent approved national long term climate action strategy,

(c) the most recent approved national adaptation framework and approved sectoral adaptation plans,

(d) the furtherance of the national climate objective, and

(e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State."

This CCIA Report has been prepared having regard to the most recent national Climate Action Plan (CAP25) and the National Adaptation Framework (2024), in line with the duty under Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended). In addition, the assessment aligns with the Fingal CAP 2024–2029 and the FDP 2023–2029, which implement national climate policy at local level. While consistency with the FCC CAP supports the delivery of national objectives, it is acknowledged that Section 15 compliance is assessed by reference to national plans and strategies. This report therefore demonstrates consistency, so far as practicable, with the national CAP25 and National Adaptation Framework, and evidences how local adaptation measures embedded in the Proposed Development contribute to those objectives.

Consistency with national climate objectives, as required under Section 15, is demonstrated through the adaptation-focused risk assessment and mitigation measures presented in Sections 3 and 4 of this Report.

1.5.5 National Adaptation Framework (NAF)

Ireland's statutory National Adaptation Framework (NAF) was published in June 2024 and was developed under the Climate Action and Low Carbon Development Act 2015. The NAF sets

out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts.

The NAF builds on the work already carried out under the National Climate Change Adaptation Framework (NCCAF, 2012). The NAF outlines a whole of government and society approach to climate adaptation in Ireland. It also aims to improve the enabling environment for adaptation through ongoing engagement with civil society, the private sector, and the research community.

Under the NAF, several government departments are required to prepare sectoral adaptation plans in relation to the priority areas that they are responsible for, which is to be reviewed once every five years. Local authorities are required to prepare local adaptation strategies. The NAF also aims to ensure ongoing engagement with civil society, the private sector, and the research community.

The NAF's emphasis on proactive adaptation is implemented through the climate risk and vulnerability assessment in Sections 3 and 4 of this Report.

1.5.6 Climate Action Plan 2025

Climate Action Plan 2025 (CAP25) (Government approval 15 April 2025) is the third statutory annual update under the Climate Act 2021. It refines actions to deliver Ireland's economy-wide carbon budgets and sectoral emissions ceilings to 2030 and charts the pathway to climate neutrality by 2050. CAP25 builds on CAP24, with a focused Annex of Actions for 2025, and cross-cutting measures in energy, buildings, transport, enterprise, land use and the adaptation agenda.

The adaptation elements of CAP25 and the 2024 National Adaptation Framework (NAF) underpin this CCIA's approach: identifying material physical risks, integrating SuDS/finished floor levels/drainage resilience, and lifecycle maintenance to ensure performance under future climate risks. On that basis, and so far as is practicable for a residential scheme, this Report demonstrates that the development is consistent with CAP25's adaptation objectives and the 2024 NAF.

The Proposed Development's alignment with CAP25 is demonstrated in Sections 3 and 4, where site-specific climate risks are assessed and adaptation measures are detailed in line with the adaptation objectives of the national plan.

1.5.7 Sustainable Development Goals

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity. The 17 SDGs are integrated—that is, they recognise that action in one area will affect outcomes in others, and that development must balance social, economic, and environmental sustainability. The creativity, knowhow, technology and financial resources from all of society is necessary to achieve the SDGs in every context. At its heart, the SDGs are about global partnership for this call to action. No matter how large or small, and regardless of their industry, all companies can contribute to the SDGs through their sustainability and corporate social responsibility strategies, policies, and processes.

Figure 1-1: UN Sustainable Development Goals

Ireland has published a Sustainable Development Goals National Implementation Plan 2022-2024 to provide a whole-of-government approach to implementing these goals. Sustainable development, climate change and equity are intrinsically intertwined. Climate change impacts can be linked in one way or another to all 17 of the UN Sustainable Development Goals (SDGs). Climate action that considers co-impacts across other SDGs can increase efficiency, reduce costs and support early and ambitious climate action.

This CCIA report focuses primarily on the climate impacts of mitigation and adaptation actions, with identified actions aligning with the objectives of the following SDGs.

Table 1-2: Relevant SDGs

SDG	Goal	Description
	Ensure availability and sustainable management of water and sanitation for all.	Support efforts to achieve universal access to safe and affordable drinking water and sanitation for all.
	Ensure access to affordable, reliable, sustainable, and modern energy for all.	Support efforts to increase the share of renewable energy in the global energy mix; and, to promote investment in clean energy research, technology and infrastructure.
	Make cities and human settlements inclusive, safe, resilient, and sustainable.	Support efforts to enhance inclusive and sustainable urbanisation, and efforts to protect and safeguard the world's cultural and natural heritage. Ensure access for all to basic services including transport and water services.

SDG	Goal	Description
	Ensure sustainable consumption and production patterns.	Support efforts to achieve the environmentally sound management of all wastes throughout their life cycle, to significantly reduce their release to air, water, and soil, and to substantially reduce waste generation through prevention, reduction, recycling, and reuse.
	Take urgent action to combat climate change and its impacts.	Support efforts to strengthen resilience and adaptive capacity to climate-related hazards and natural disasters, and to integrate climate change measures into company policies, strategy, and planning.
	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.	Support efforts to prevent and significantly reduce marine pollution of all kinds.
	Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.	Support efforts to ensure the conservation and sustainable use of terrestrial and inland freshwater ecosystems, efforts to halt deforestation and combat desertification, efforts to ensure the conservation of mountain ecosystems and reduce the degradation of natural habitats, and efforts to halt the loss of biodiversity and protect and prevent the extinction of threatened species

The SDGs referenced here are advanced through the practical design responses outlined in Sections 3 and 4 of this Report. In Section 5 of this Report, the relevant policy objectives of the FDP have been carefully considered in the context of the above-listed SDGs, and their incorporation into the Proposed Development design.

1.5.8 Nature

The close relationship between climate and nature emphasises the need for coordinated action that addresses both. While it remains beyond the scope of the current CCIA report, we reiterate our recommendation to consider the impacts of climate and nature in tandem, rather than separately.

Ireland's 4th National Biodiversity Action Plan (NBAP) sets the national biodiversity agenda for the period 2023-2030 and aims to deliver the transformative changes required to the ways in which we value and protect nature. Ireland's planning system has an important role in safeguarding biodiversity by ensuring that new development is sustainable and does not have a negative impact on the environment. The Irish NBAP underscores that there are opportunities to deliver for biodiversity in the assessment of new planning applications, as well as the application of best-practice principles for urban design and landscape management, such as green infrastructure and nature-based solutions.

The NBAP will continue to implement actions within the framework of five strategic objectives, while addressing new and emerging issues:

- Objective 1 - Adopt a Whole of Government, Whole of Society Approach to Biodiversity
- Objective 2 - Meet Urgent Conservation and Restoration Needs
- Objective 3 - Secure Nature's Contribution to People
- Objective 4 - Enhance the Evidence Base for Action on Biodiversity
- Objective 5 - Strengthen Ireland's Contribution to International Biodiversity Initiatives

Local Biodiversity Action Plans (LBAP) further support the objectives of the NBAP and so should also be consulted to identify biodiversity objectives, targets and guidelines for the lifecycle of the proposed development.

Nature acts as a vital regulator of climate, while climate change threatens biodiversity and ecosystem health. To combat these challenges effectively, climate action must integrate efforts to conserve and restore natural ecosystems. By doing so, we can mitigate climate change impacts and protect biodiversity, ensuring a more resilient and sustainable future.

In June 2024, the EU Council formally adopted the Nature Restoration Law. Under the Nature Restoration Law, EU member states will need to restore at least 30% of habitats in poor condition by 2030, 60% by 2040, and 90% by 2050. The regulation sets out specific requirements for different types of ecosystems, including agricultural land, forests, and urban ecosystems. Increasing forest birds' population and making sure there is no net loss on urban green spaces and tree canopy cover until end of 2030 are also key measures of this new law. The regulation will now be published in the EU's Official Journal and enter into force. It will become directly applicable in all member states and specific targets for each sector are likely.

2 CLIMATE CHANGE PROJECTIONS

The Supplementing Regulation establishes the Technical Screening Criteria specific to certain economic activities. Annex II, Section 7.1 of the Supplementing Regulation ('the construction of new buildings') includes specific requirements relating to climate projections:

2. The climate risk and vulnerability assessment is proportionate to the scale of the activity and its expected lifespan, such that:

(a) for activities with an expected lifespan of less than 10 years, the assessment is performed, at least by using climate projections at the smallest appropriate scale;

(b) for all other activities, the assessment is performed using the highest available resolution, state-of-the-art climate projections across the existing range of future scenarios consistent with the expected lifetime of the activity, including, at least, 10-to-30-year climate projections scenarios for major investment.

3. The climate projections and assessment of impacts are based on best practice and available guidance and take into account the state-of-the-art science for vulnerability and risk analysis and related methodologies in line with the most recent Intergovernmental Panel on Climate Change reports, scientific peer-reviewed publications and open source or paying models.

The current assessment has utilised climate projections from IPCC AR6 WGI and the IPCC WGI online Interactive Atlas for Northern Europe; and *Climate Ireland* Climate Change Projection Maps[6] in combination with EPA Research Report No. 339[7]. Due to the expected lifespan of the Proposed Development, climate projections have been provided for mid-term and long-term periods (2041–2060, 2041-2070, and 2081–2100).

A new set of illustrative scenarios have been developed by the IPCC AR6 WGI which cover the range of possible future developments of anthropogenic drivers of climate change found in literature, derived from the Shared Socio-economic Pathways (SSPs). Concentration trajectories known as Representative Concentration Pathways (RCPs) were utilised in EPA Research Report No.339. These RCPs were considered by the IPCC in their Fifth Assessment Report (AR5). For this study, intermediate (SSP2-4.5 and RCP4.5) and very high (SSP5-8.5 and RCP8.5) GHG emissions scenarios were utilised in both the medium and long-term periods; this is considered a conservative assumption of future GHG emission paths. These scenarios are detailed in the following Sections.

All "climate-related hazards" have been classified as either "chronic" or "acute". Chronic effects are gradual slow onset developments (e.g., long term rise in mean annual air temperature); whereas acute effects are rapidly developing climate extremes and/or increased variability (e.g., heatwaves).

[6] Climate Ireland - Climate Change Projection Maps.

[7] P. Nolan and J. Flanagan (2020) High-Resolution Climate Projections for Ireland – a Multi-model Ensemble Approach. EPA Research Report No. 339.

2.1 Overview of Climate Modelling

With increasing atmospheric greenhouse gas concentrations driving changes in all aspects of the climate system, climate change is representing an urgent and potentially irreversible threat to human societies globally. Accurate climate projections are a key scientific input for national policymakers when planning for, and adapting to, the challenges posed by climate change.

Climate projections are produced using climate models, which have been developed by scientists over recent decades and are capable of simulating Earth's past, present, and future climate. Global Climate Models (GCMs) are used to model the global impacts on Earth's climate of increasing greenhouse gas concentrations in the atmosphere at a resolution of ~50km or coarser. Regional Climate Models (RCMs) are used to capture key small-scale atmospheric features on the scale of 1-10km, such as local convection and wind gusts. Multi-model ensembles are often used in climate prediction studies to quantify associated model uncertainty.

RCMs utilise the output of GCMs and model regional climates at higher spatial resolutions; this process is known as dynamic downscaling. This approach allows key climate variables to be modelled more precisely, including precipitation; near-surface temperature; and the number and intensity of low-pressure systems. Low pressure systems are the primary driver of precipitation and wind affecting the country; therefore, the added value of RCMs in the modelling of low-pressure systems is of particular importance for Ireland.

Future greenhouse gas concentrations in the atmosphere are also uncertain. To model possible future climate change, varying greenhouse gas concentrations over time are needed as a GCM input. The core set of SSP scenarios used in the AR6 WGI report cover a broad range of emissions pathways, including new low-emissions pathways. They start in 2015 and include scenarios with high and very high greenhouse gas (GHG) emissions (SSP3-7.0 and SSP5-8.5) and CO_2 emissions that roughly double from current levels by 2100 and 2050, respectively; scenarios with intermediate GHG emissions (SSP2-4.5) and CO_2 emissions remaining around current levels until the middle of the century; and scenarios with very low and low GHG emissions and CO_2 emissions declining to net zero around or after 2050, followed by varying levels of net negative CO_2 emissions (SSP1-1.9, SSP1-2.6).

Concentration trajectories known as Representative Concentration Pathways (RCPs) were utilised in EPA Research Report No.339. These RCPs were considered by the IPCC in their Fifth Assessment Report (AR5) and include the following four scenarios: RCP2.6, RCP4.5, RCP6 and RCP8.5. For the EPA study, two RCPs were chosen, RCP4.5 and RCP8.5. RCP4.5 is considered an intermediate scenario, while RCP8.5 is considered to be representative of a potential worst-case scenario. RCP scenarios are also utilised in the TRANSLATE dataset. TRANSLATE incorporates this EPA data and also uses AR5 (RCP) scenarios. This is the only available climate projection data for Ireland which has been developed for policy makers, and is steered by DECC, the EPA, Met Eireann, and the LA CAROs.

Figure 2-1 illustrates the future annual emissions of CO_2 and of a subset of key non-CO_2 drivers, across the latest five illustrative scenarios developed by the IPCC:

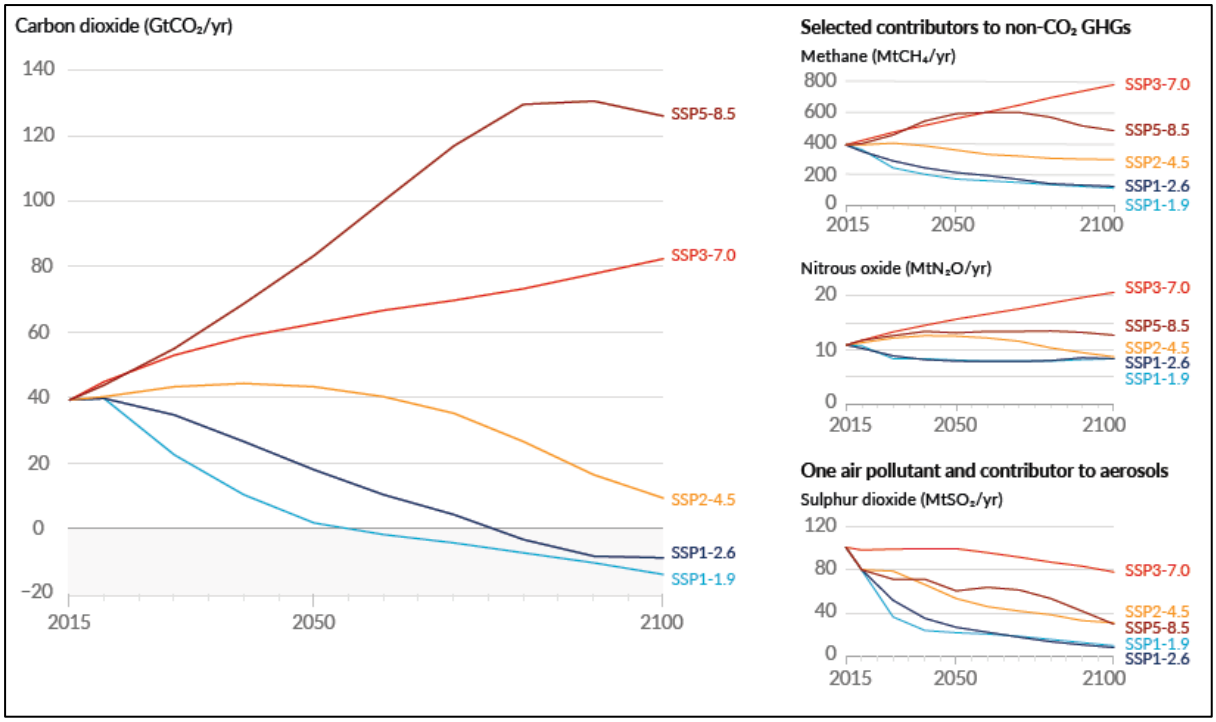

Figure 2-1: Future annual emissions of CO_2 (left) and of a subset of key non-CO_2 drivers (right), across five illustrative scenarios (source: adapted from IPCC AR6 WGI Summary for Policy Makers)

Figure 2-2 illustrates the global surface temperature change relative to 1850-1900 under each scenario:

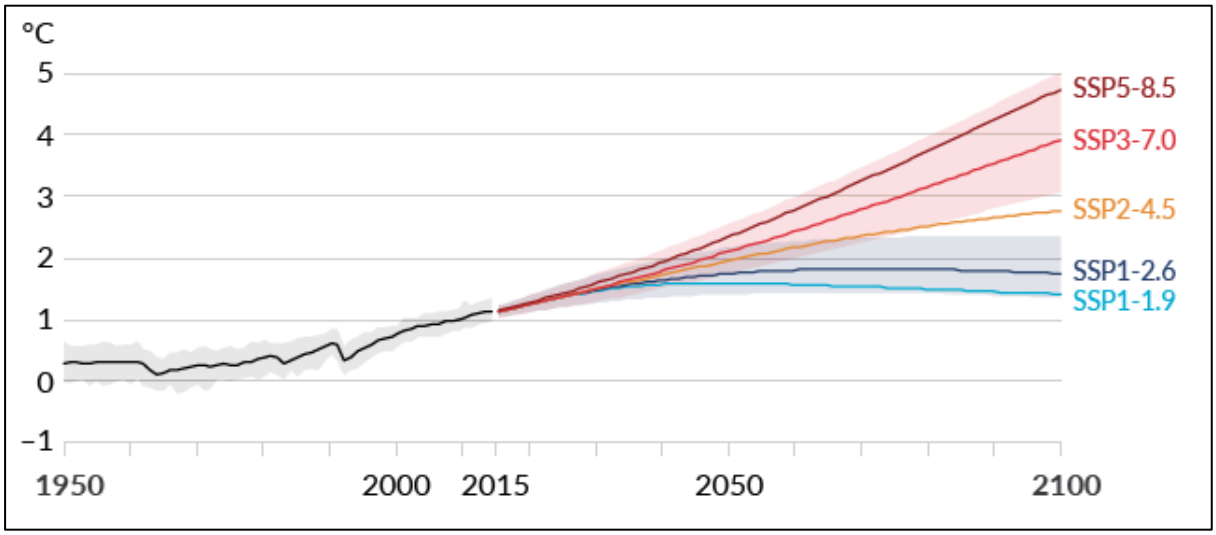

Figure 2-2: global surface temperature change relative to 1850-1900 (source: adapted from IPCC AR6 WGI Summary for Policy Makers)

2.2 IPCC AR6 WGI Regional Climate Projections

IPCC AR6 WGI assesses the current evidence on the physical science of climate change, evaluating knowledge gained from observations, reanalyses, paleoclimate archives and climate model simulations, as well as physical, chemical, and biological climate processes.

The WGI contribution to AR6 is focused on physical and biogeochemical climate science information, with particular emphasis on regional climate changes.

According to IPCC AR6 WGI, sustained changes have been documented in all major elements of the climate system, including the atmosphere, land, cryosphere, biosphere and ocean. Multiple lines of evidence indicate the unprecedented nature of recent largescale climatic changes in the context of all human history. The key findings of the WGI contribution to AR6 are as follows:

- It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred;

- Global surface temperature will continue to increase until at least mid-century under all emissions scenarios considered. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO_2 and other greenhouse gas emissions occur in the coming decades;

- Observed increases in well-mixed greenhouse gas (GHG) concentrations since around 1750 are unequivocally caused by human activities;

- Each of the last four decades has been successively warmer than any decade that preceded it since 1850;

- The likely range of total human-caused global surface temperature increase from 1850–1900 to 2010–2019 is 0.8°C to 1.3°C, with a best estimate of 1.07°C;

- Globally averaged precipitation over land has likely increased since 1950, with a faster rate of increase since the 1980s;

- It is virtually certain that the global upper ocean (0–700 m) has warmed since the 1970s and extremely likely that human influence is the main driver;

- Global mean sea level increased by 0.20 [0.15 to 0.25] m between 1901 and 2018. The average rate of sea level rise was 1.3 [0.6 to 2.1] mm/year between 1901 and 1971, increasing to 1.9 [0.8 to 2.9] mm/year between 1971 and 2006, and further increasing to 3.7 [3.2 to 4.2] mm/year between 2006 and 2018.

Key model intercomparisons supporting AR6 include the Coupled Model Intercomparison Project Phase 6 (CMIP6) and the Coordinated Regional Climate Downscaling Experiment (CORDEX), for global and regional models respectively. Results using CMIP Phase 5 (CMIP5) simulations are also assessed. Since AR5, large ensemble simulations, where individual models perform multiple simulations with the same climate forcings, are increasingly used to inform understanding of the relative roles of internal variability and forced change in the climate system, especially on regional scales. The broader availability of ensemble model simulations has contributed to better estimations of uncertainty in projections of future change.

Chapter 12 of IPCC AR6 WGI and the online Interactive Atlas have been utilised in this assessment to summarise climate projections and conduct a detailed inspection of projected changes in climate for the region of the Proposed Development. Chapter 12 of IPCC AR6 WGI provides a comprehensive, region-specific assessment of changing climatic conditions that may be hazardous or favourable for various sectors. The online Interactive Atlas is an online tool that complements the WGI Report by providing flexible temporal and spatial analyses of trends and changes in key atmospheric and oceanic variables, extreme indices and climatic impact-drivers (CIDs), as obtained from several global and regional observational and model simulated datasets used in the report. The Interactive Atlas presents detailed projected global and regional climate changes at near-, mid- and long-term periods, 2021–2040, 2041–2060 and 2081–2100, respectively, for a range of emissions scenarios. Within the Interactive Atlas, spatially aggregated regional information is provided for different predefined sets of regions:

- The sub-continental AR6 WGI reference regions;
- WG II continental regions;
- Monsoon regions;
- Major river basins;
- Small-island regions;
- Ocean biological activity regions.

Under the sub-continental AR6 WGI reference regions, Europe is divided into four climatic regions: Northern Europe (NEU), Western and Central Europe (WCE), Eastern Europe (EEU) and Mediterranean (MED). Ireland is part of NEU, therefore aggregated climate information for this region has been derived for this assessment and is summarised in the following Table 2-1.

The IPCC AR6 WGI describe “climate related hazards” as Climatic Impact Drivers (CID). CIDs are defined by the IPCC as physical climate system conditions (e.g., means, events, extremes) that can be directly connected with having impacts on human or ecological systems. This terminology has been retained in this assessment.

In the following Table 2-1, a summary of projections for NEU has been provided for each CID along with detailed climate projection data, sourced using the WGI online Interactive Atlas. The detailed projections provide the median and 25th to 75th percentile range for each variable under the intermediate (SSP2-4.5) and very high (SSP5-8.5) GHG emissions scenarios in both the medium and long-term periods. In some cases, Atlas data was not available for certain variables; IPCC AR6 WGI summary findings were used to supplement Atlas data in this case.

Table 2-1: Climate Projections for Northern Europe (Data Source: IPCC AR6 & IPCC WGI online Interactive Atlas)

IPCC Climate Impact Driver Category	IPCC Climate Impact Driver (CID) / Climate-related hazard	IPCC AR6 Summary Findings[8]	IPCC WGI Interactive Atlas Data[9] (SSP2-4.5 Scenario)[10]	IPCC WGI Interactive Atlas Data[11] (SSP5-8.5 Scenario)[12]
Heat and Cold	Temperature Projections (Chronic)	Since AR5, studies have confirmed that the mean warming trend in Europe is increasing. Irrespective of the scenario, it is virtually certain that warming will continue in Europe, and there is high confidence[13] that the observed increase in heat extremes is due to human activities. All temperature trends are very likely to continue for a global warming level (GWL) of 1.5°C or 2°C and 3°C.	**Increase in mean temperature in Medium Term (2041-2060):** Median: +1.5ºC P25-P75: +1.2ºC to +1.9ºC **Increase in mean temperature in Long Term (2081-2100):** Median: +2.4ºC P25-P75: +1.8ºC to +3.0ºC	**Increase in mean temperature in Medium Term (2041-2060):** Median: +2.0ºC P25-P75: +1.5ºC to +2.5ºC **Increase in mean temperature in Long Term (2081-2100):** Median: +4.4ºC P25-P75: +3.6ºC to +5.5ºC
	Heatwave (Acute)	The frequency of heatwaves observed in Europe has very likely increased in recent decades due to human-induced change in atmospheric composition. It is very likely that the frequency of heatwaves will increase during the 21st century regardless of the emissions scenario in each European region, and for 1.5°C and 2°C GWLs.	**Increase in number of days with a maximum temperature above 35ºC in Medium Term (2041-2060):** Median: 0.1 P25-P75: 0 to 0.1 **Increase in number of days with a maximum temperature above 35ºC in Long Term (2081-2100):**	**Increase in number of days with a maximum temperature above 35ºC in Medium Term (2041-2060):** Median: 0.1 P25-P75: 0 to 0.1 **Increase in number of days with a maximum temperature above 35ºC in Long Term (2081-2100):**

[8] Working Group I contribution to the Sixth Assessment Report, Climate Change 2021: The Physical Science Basis. Chapter 12: Climate Change Information for Regional Impact and for Risk Assessment.

[9] IPCC WGI online Interactive Atlas Parameters: Model projection CMIP6; SSP2-2.4 Scenario; Annual; Relative to 1995-2014 Baseline.

[10] This is a "middle of the road" scenario. CO_2 emissions hover around current levels before starting to fall mid-century, but do not reach net-zero by 2100.

[11] IPCC WGI online Interactive Atlas Parameters: Model projection CMIP6; SSP5-8.5 Scenario; Annual; Relative to 1995-2014 Baseline.

[12] This represents the high end of the range of future pathways. CO_2 emissions triple by 2075.

13 Confidence is a qualitative measure of the validity of a finding, based on the type, amount, quality and consistency of evidence (e.g., data, mechanistic understanding, theory, models, expert judgment) and the degree of agreement.

IPCC Climate Impact Driver Category	IPCC Climate Impact Driver (CID) / Climate-related hazard	IPCC AR6 Summary Findings[8]	IPCC WGI Interactive Atlas Data[9] (SSP2-4.5 Scenario)[10]	IPCC WGI Interactive Atlas Data[11] (SSP5-8.5 Scenario)[12]
			Median: 0.1 P25-P75: 0 to 0.2	Median: 0.5 P25-P75: 0.1 to 0.7
	Frost days (Acute)	The frequency of frost days will very likely decrease for all scenarios and all time-horizons with consequences for agriculture and forests. A simple heating degree day index, characterizing heating demand, shows a large observed decreasing trend for winter heating energy demand in Europe. This trend is very likely to continue through the 21st century, with decreases in the range of 20–30% for Northern Europe.	**Decrease in number of frost days in Medium Term (2041-2060):** Median: -19.8 P25-P75: -28.5 to -12.5 **Decrease in number of frost days in Long Term (2081-2100):** Median: -32.6 P25-P75: -39.2 to -26.4	**Decrease in number of frost days in Medium Term (2041-2060):** Median: -27.6 P25-P75: -35.3 to -20.9 **Decrease in number of frost days in Long Term (2081-2100):** Median: -57 P25-P75: -64.5 to -46.8
Wet and Dry	Precipitation (Chronic)	Precipitation has generally increased in northern Europe. It is very likely that precipitation will increase in Northern Europe in December, January, and February under all climate scenarios except RCP2.6[14]/SSP1-2.6 and for both mid- and end-century periods.	**Increase in total precipitation in Medium Term (2041-2060):** Median: 3.3% P25-P75: 1.8% to 4.9% **Increase in total precipitation in Long Term (2081-2100):** Median: 4.9% P25-P75: 2.3% to 7.6%	**Increase in total precipitation in Medium Term (2041-2060):** Median: 4.6% P25-P75: 2.5% to 7.1% **Increase in total precipitation in Long Term (2081-2100):** Median: 10.3% P25-P75: 7.8% to 13.7%
	River Flood Heavy Precipitation and Pluvial Flood (Acute)		**Increase in maximum 1-day precipitation amount in Medium Term (2041-2060):** Median: 5.9% P25-P75: 4.0% to 7.8%	**Increase in maximum 1-day precipitation amount in Medium Term (2041-2060):** Median: 8.3% P25-P75: 6.0% to 9.5%

[14] RCP 2.6 is a "very stringent" pathway. RCP 2.6 is likely to keep global temperature rise below 2°C by 2100.

IPCC Climate Impact Driver Category	IPCC Climate Impact Driver (CID) / Climate-related hazard	IPCC AR6 Summary Findings[8]	IPCC WGI Interactive Atlas Data[9] (SSP2-4.5 Scenario)[10]	IPCC WGI Interactive Atlas Data[11] (SSP5-8.5 Scenario)[12]
		There is medium confidence that river floods will decrease in Northern Europe under RCP8.5[15] and low confidence under RCP2.6. Heavy precipitation frequency trends have been detected and attributed to climate change in with high confidence in Northern Europe.	**Increase in maximum 1-day precipitation amount in Long Term (2081-2100):** Median: 10.3% P25-P75: 6.3% to 13.9%	**Increase in maximum 1-day precipitation amount in Long Term (2081-2100):** Median: 20.2% P25-P75: 14.1% to 24.1%
			Increase in maximum 5-day precipitation amount in Medium Term (2041-2060): Median: 4.7% P25-P75: 3.5% to 6.1% **Increase in maximum 5-day precipitation amount in Long Term (2081-2100):** Median: 8.2% P25-P75: 4.7% to 11.2%	**Increase in maximum 5-day precipitation amount in Medium Term (2041-2060):** Median: 6.5% P25-P75: 4.3% to 8.9% **Increase in maximum 5-day precipitation amount in Long Term (2081-2100):** Median: 16.2% P25-P75: 12% to 20.6%
	Drought (Acute)	Higher precipitation that outweighs the effects of increased evapotranspiration is expected to result in a decrease in streamflow drought frequency in Northern Europe. A reduction of drought length and magnitude is projected for Northern Europe.	**Likely increase in number of consecutive dry days in Medium Term (2041-2060):** Median: 0.2 P25-P75: -0.1 to 0.7 **Increase in number of consecutive dry days in Long Term (2081-2100):** Median: 0.6	**Likely increase in number of consecutive dry days in Medium Term (2041-2060):** Median: 0.3 P25-P75: -0.1 to 0.7 **Increase in number of consecutive dry days in Long Term (2081-2100):** Median: 1.4

15 In RCP 8.5 emissions continue to rise throughout the 21st century. This high-emissions scenario is frequently referred to as “business as usual”, suggesting that is a likely outcome if society does not make concerted efforts to cut greenhouse gas emissions.

IPCC Climate Impact Driver Category	IPCC Climate Impact Driver (CID) / Climate-related hazard	IPCC AR6 Summary Findings[8]	IPCC WGI Interactive Atlas Data[9] (SSP2-4.5 Scenario)[10]	IPCC WGI Interactive Atlas Data[11] (SSP5-8.5 Scenario)[12]
			P25-P75: 0.1 to 0.11	P25-P75: 0.6 to 2.1
Wind	Surface Wind Speed (Chronic)	There is medium confidence that mean surface wind speeds have decreased in Europe as in many other areas of the Northern Hemisphere over the past four decades. Under RCP4.5[16] and RCP8.5 scenarios, projections indicate a decrease in mean wind speed in Northern Europe (medium confidence).	**Negligible change in mean surface windspeed in Medium Term (2041-2060):** Median: -0.8% P25-P75: -1.7% to 0.2% **Decrease in mean surface windspeed in Long Term (2081-2100):** Median: -1.9% P25-P75: -2.9% to -1.2%	**Decrease in mean surface windspeed in Medium Term (2041-2060):** Median: -1.1% P25-P75: -1.6% to -0.5% **Decrease in mean surface windspeed Long Term (2081-2100):** Median: -2.8% P25-P75: -4.5% to -1.2%
	Severe Windstorms (Acute)	There are large uncertainties in past evolutions of windstorms and extreme winds in Europe. Extreme near-surface winds have been decreasing in the past decades according to near-surface observations. Strong winds and extratropical storms are projected to have a slightly increasing frequency and amplitude in the future in Northern Europe.	*No atlas data available for severe windstorms.*	
Snow and Ice	Snowfall (Chronic)	Widespread and accelerated declines in snow depth and snow water equivalent have been observed in Europe. There is high confidence that future snow cover extent and seasonal duration will reduce.	**Decrease in snowfall (mm/day) in Medium Term (2041-2060):** Median: -2.8	**Decrease in snowfall (mm/day) in Medium Term (2041-2060):** Median: -3.9

[16] RCP 4.5 is described by the IPCC as an intermediate scenario. Emissions in RCP 4.5 peak around 2040, then decline. It is a scenario of long-term, global emissions of greenhouse gases, short-lived species, and land-use-landcover which stabilizes radiative forcing at 4.5 Watts per meter squared (W m^2, approximately 650 ppm CO_2-equivalent) in the year 2100 without ever exceeding that value.

IPCC Climate Impact Driver Category	IPCC Climate Impact Driver (CID) / Climate-related hazard	IPCC AR6 Summary Findings[8]	IPCC WGI Interactive Atlas Data[9] (SSP2-4.5 Scenario)[10]	IPCC WGI Interactive Atlas Data[11] (SSP5-8.5 Scenario)[12]
			P25-P75: -4.0 to -1.8 **Decrease in snowfall (mm/day) in Long Term (2081-2100):** Median: -4.8 P25-P75: -5.6 to -3.7	P25-P75: -5.0 to -2.6 **Decrease in snowfall (mm/day) in Long Term (2081-2100):** Median: -7.9 P25-P75: -9.6 to -6.2
	Heavy snowfall, ice storms and hail (Acute)	There is low confidence that climate change will affect ice and snow-related episodic hazards (limited evidence).	*No atlas data available for heavy snowfall, ice storms and hail.*	
Coastal and Oceanic	Sea level rise (Acute)	Relative sea level rise is extremely likely to continue in the oceans around Europe.	**Increase in sea level (metres) in Medium Term (2041-2060):** Median: 0.2 P25-P75: 0.1 to 0.3 **Increase in sea level (metres) in Long Term (2081-2100):** Median: 0.4 P25-P75: 0.2 to 0.5	**Increase in sea level (metres) in Medium Term (2041-2060):** Median: 0.2 P25-P75: 0.1 to 0.3 **Increase in sea level (metres) in Long Term (2081-2100):** Median: 0.5 P25-P75: 0.3 to 0.7
	Coastal flooding (Chronic)	Relative sea level rise is extremely likely to continue around Europe, contributing to increased coastal flooding in low-lying areas. The present-day 1-in-100-year extreme total water level (ETWL) is between 2.5 and 5.0 m around the UK. There is high confidence that extreme total water level (ETWL) magnitude and occurrence frequency will increase throughout Europe. Under RCP4.5, the present day 1-in-100-year ETWL is projected to have median return periods of between 1-in-20-years and	*No atlas data available for coastal flooding.*	

IPCC Climate Impact Driver Category	IPCC Climate Impact Driver (CID) / Climate-related hazard	IPCC AR6 Summary Findings[8]	IPCC WGI Interactive Atlas Data[9] (SSP2-4.5 Scenario)[10]	IPCC WGI Interactive Atlas Data[11] (SSP5-8.5 Scenario)[12]
		1-in-50-years by 2050 and between 1-in-5-years and 1-in-20-years by 2100.		
Other	Compound events	One typical compound event that is observed in the European area is compound flooding due to the combination of extreme sea level events and extreme precipitation events associated with high levels of runoff. Under RCP8.5, the probability of these events is projected to increase along northern European coasts, with the percentage of coastline now experiencing such events at least once every 6 years increasing by between 3% and 11% by the end of the 21st century. Compound events of dry and hot summers have increased in Europe. The probability of such compound events has increased across much of Europe between 1950–1979 and 1984–2013. Compound hot and dry extremes are projected to increase in Europe by mid-century for the Special Report on Emission Scenarios (SRES) A1B and RCP8.5 scenarios.	*No atlas data available for compound events.*	

2.3 Other Relevant Scientific Based Climate Predictions

2.3.1 TRANSLATE: One Climate Resource for Ireland

The TRANSLATE project is a Met Éireann lead initiative to standardise future climate projections for Ireland and develop climate services that meet the climate information needs of decision makers. It is a collaborative effort led by climate researchers from University of Galway – Irish Centre for High End Computing (ICHEC), and University College Cork – SFI Research Centre for Energy, Climate and Marine (MaREI), supported by Met Éireann climatologists.

TRANSLATE focuses on reviewing existing climate models to produce a national set of standardised climate projections. Climate services are then developed from these standardised climate projections to aid climate risk decision making across multiple sectors (for example, transport, energy, water). Climate services can be described as a set of services that communicate climate science data/information into products (for example, indices, risk assessments, uncertainty estimates) tailored to meet climate sensitive decision makers.

TRANSLATE's outputs are produced using a selection of internationally reviewed and accepted models from both CORDEX and high-resolution regional projections produced by ICHEC. Together they demonstrate a range of possible futures for Ireland based on assumptions of global human activity resulting in "least", "more" or "most" climate change. Historical climate data is evaluated against the observational record and corrected to remove any model bias. This correction is then applied to all future data. This allows information to be presented on how the variables change (difference) as well as actual values (absolute).

2.3.1.1 Climate Ireland – Climate Change Projection Maps

Climate Ireland is Ireland’s national adaptation platform and is provided by the Environmental Protection Agency as part of the EPA's climate adaptation work.

The Climate Change Projection Maps viewer has been developed to understand current and projected future climate conditions for Ireland. Observed Climate Information is based on TRANSLATE and Climate Change Projections are based on TRANSLATE along with EPA Research Report No. 339[17] for some variables.

The Climate Data Explorer provides three types of climate information:

- Observed Climate Information: average historical climate data on variables including temperature and precipitation for the period 1976-2005.
- Climate Change Projections (standardised and bias-corrected): future projections of changes for variables such as temperature and precipitation for a selection of time periods, scenarios and global warming levels (from Met Éireann's TRANSLATE project - O'Brien and Nolan (2023)).

[17] P. Nolan and J. Flanagan (2020) High-Resolution Climate Projections for Ireland – a Multi-model Ensemble Approach. EPA Research Report No. 339.

- Climate Change Projections (non-standardised): future projections of changes for variables such as snowfall, driving rain and wind energy for the period 2041-2060 (these projections come from Nolan and Flanagan (2020) and are compared to 1981-2000, rather than the TRANSLATE parameters). As further results come from standardised projects these maps will be replaced.

2.3.1.2 EPA Climate Projections

The EPA's Research Report on Climate Projections for Ireland (Research Report No. 339)[18] employs regional climate modelling to assess the impacts of a warming climate on the 21st-century climate of Ireland. Regional climate models (RCMs) take the outputs from global climate models (GCMs) to produce more refined projections of the potential local and regional impacts of climate change. The RCM simulations were run at high spatial resolution (3.8km and 4km) which allowed for a more realistic representation of important physical processes and enabling a more accurate evaluation of the local impacts of climate change across Ireland.

A multi-model ensemble approach was employed in the study to address the issue of uncertainty. Through the ensemble approach, the uncertainty in the projections can be partly quantified, thus providing a measure of confidence in the projections. Different RCMs were used to downscale outputs from a number of different CMIP5 (Coupled Model Intercomparison Project – Phase 5) GCMs.

Simulations were run for the reference period 1981–2000 and the future period 2041–2060. Differences between the two periods provide a measure of climate change. To account for the uncertainty in future greenhouse gas emissions and changing land use, and how the world will come together to respond to the challenge of climate change, the future climate was simulated under both the Representative Concentration Pathway 4.5 (RCP4.5) and RCP8.5 scenarios. The climate projections of EPA Research Report No. 339 are in broad agreement with previous research, which adds a measure of confidence to the projections.

2.3.2 Ireland's Changing Climate

Ireland's climate is changing in line with global trends, with a temperature increase of, on average, 0.8°C compared with 1900. By the middle of this century (2041 – 2060) the average annual temperatures are projected to increase by between 1–1.2℃ and 1.3–1.6℃ depending on the emissions trajectory. The number of warm days is expected to increase and heat waves are expected to occur more frequently.

The mean annual temperature for Ireland has experienced an overall increase of 0.9°C over the last 120 years with fifteen of the top 20 warmest years on record having occurred since 1990.

There has been a decrease in the number of frost days (temperatures below 0°C) and a shortening of the frost season duration. In contrast, there has been an increase in the number

[18] P. Nolan and J. Flanagan (2020) High-Resolution Climate Projections for Ireland – a Multi-model Ensemble Approach. EPA Research Report No. 339.

of warm days (temperature > 20°C). This is in line with trends evident for the rest of Western Europe.

For Ireland, satellite observations indicate that sea levels around Ireland have increased by approximately 2-3 mm per year since the 1990s.

When compared with an annual average rainfall of 1186mm in the period 1961-1990, the thirty-year period 1990-2019 shows a 70mm or almost 7% increase in rainfall. The last decade from 2006 - 2015 has been the wettest period in the period 1711- 2016 and there is evidence of an increasing trend in winter rainfall and a decreasing trend in summer rainfall. This information is derived from the latest 30-year averages from Met Eireann (1991-2019). 30-years is the standard reference period as established by the world meteorological organisation, and data is only required to be updated every 10-years.

Other climate change indicators, as detailed in Met Eireann's Annual Climate Statement (2025) include:

- The average annual air temperature for Ireland in 2025 (using the Island of Ireland dataset*) was 11.14 °C, which is 1.59°C above the 1961-1990 long-term average (LTA) or 0.97°C above the most recent 1991-2020 LTA.
- This makes 2025 the second warmest year on record, which is only slightly behind the warmest year in 2023 (11.21 °C) and only the second time with a mean over 11 °C.
- The last 4 years (2022-2025) are now the 4 warmest years on record with 2024 tying 2007 for 4th warmest, and seven of the top ten warmest years have occurred since 2005.
- The coldest year on record was in 1919 with 8.73 °C, of the top ten coldest years – none have occurred since 2000.
- Provisionally rainfall data suggests 2025 was the 15th wettest year since 1941, 104% of the 1991-2020 LTA, with observed average of 1,338.7 mm.

The climate projections for the next century indicate that observed climate trends will continue and intensify over the coming decades. Predicted impacts include:

- Changes in wind speeds and storm tracks;
- Increased likelihood of river and coastal flooding;
- Changes in distribution of plant and animal species and in the phenology (the timing of lifecycle events) of native species;
- Water stress for crops, pressure on water supply and adverse impacts on water quality;
- Negative impacts on human health and wellbeing.

Adaptation refers to actions taken to reduce vulnerability and exposure to climate change impacts. The more we reduce global emissions, the less adaptation to the consequences of climate change will be required. However, some impacts are already unavoidable.

The following Table 2-2 provides a summary of climate projections for Ireland and specific climate model simulations for FCC using a combination of the *Climate Ireland* Climate Change Projection Maps[19] and EPA Research Report No. 339[20]. For the purposes of this report, the climate variables observed have been determined as "climate-related hazards" and have been grouped according to the IPCC CID Categories.

Climate projections were obtained for the future periods 2041-2060 and 2041-2070. The reference periods have been set at 1976-2005 and 1980-2000. Differences between the reference periods and future periods provide a measure of climate change. The climate scenarios utilised in the assessment are RCP4.5 and RCP8.5.

[19] Climate Ireland - Climate Change Projection Maps.

[20] P. Nolan and J. Flanagan (2020) High-Resolution Climate Projections for Ireland – a Multi-model Ensemble Approach. EPA Research Report No. 339.

Table 2-2: Climate Projections for Ireland and Dublin (Data Source: Climate Ireland Climate Change Projection Maps)

IPCC Climate Impact Driver Category	Climate-related Hazard	Summary of Projections for Ireland[21]	Climate Model Simulations for Dublin[22] (RCP4.5 Scenario)	Climate Model Simulations for Dublin[22] (RCP8.5 Scenario)
Heat and Cold	Temperature Projections (Chronic) (Reference period 1976-2005; Future period: 2041-2070)	Mid-century mean annual temperatures are projected to increase by 0.6–1.7°C and 1.1–1.9°C for the RCP4.5 and RCP8.5 scenarios, respectively. Temperature projections show a clear west-to-east gradient, with the largest increases in the east.	Mean annual temperature change: +1.3°C Greatest seasonal change in Autumn with an expected increase of +1.6°C	Mean annual temperature change: +1.7°C Greatest seasonal change in Autumn with an expected increase of +2°C
	Surface Humidity (Chronic) (Reference Period 1981-2000; Future period: 2041-2060)	Specific humidity [23] is projected to increase substantially (≈10%) for all seasons by the middle of the century. Relative humidity [24] is projected to increase slightly (or show ≈0% change) for all seasons except summer. For summer, relative humidity is expected to decrease in the south-east and increase in the north-west (both RCP scenarios).	Annual mean change in specific humidity: +8.5% Relative humidity is projected to decrease slightly or show ≈0% change.	Annual mean change in specific humidity: 10.5% to 11.5% Relative humidity is projected to increase slightly or show ≈0% change.
	Heatwave[25] (Acute) (Reference period 1976-2005; Future period: 2041-2070)	The large projected increase in high summer temperatures suggests an increase in the number of heatwave events by the middle of the century. The changes range from -0.05 to 0.21 for the RCP4.5 scenario and from 0.04 to 0.28	Change in daily max temperature: +1.2°C Increase in the number of heatwave events: 0.2 to 0.4	Change in daily max temperature: +1.7°C Increase in the number of heatwave events: 0.3 to 0.5

[21] P. Nolan and J. Flanagan (2020) High-Resolution Climate Projections for Ireland – a Multi-model Ensemble Approach. EPA Research Report No. 339.
[22] Simulations were run for the reference period 1981–2000 and the future period 2041–2060.
[23] Specific humidity is the amount of water vapour in the atmosphere calculated as the ratio of the mass of water vapour to the total mass of the air parcel.
[24] Relative humidity is the ratio of the amount of water vapour present in the air to the greatest amount possible at the same temperature.

IPCC Climate Impact Driver Category	Climate-related Hazard	Summary of Projections for Ireland[21]	Climate Model Simulations for Dublin[22] (RCP4.5 Scenario)	Climate Model Simulations for Dublin[22] (RCP8.5 Scenario)
		for the RCP8.5 scenario. A sustained increase in the daily maximum temperature is associated with heatwaves.		
	Frost and Ice days (Acute) (Reference period 1976-2005; Future period: 2041-2070)	The large projected decrease in cold nights implies a decrease in the number of frost and ice days by the middle of the century. The number of frost days (days when the minimum temperature is <0°C) is projected to decrease by 22.09 to 8.84 under the RCP 4.5 scenario and 27.75 to 15.50 under the RCP 8.5 scenario. The number of ice days (days when the maximum temperature is <0°C) is projected to decrease by 0.36 to 0.10 in the RCP 4.5 scenario and 0.36 to 0.20 in the RCP 8.5 scenario.	The number of frost days is projected to decrease by 5 to 20. The number of ice days is projected to decrease by 0.1 to 3.0.	The number of frost days is projected to decrease by 10 to 25. The number of ice days is projected to decrease by 0.2 to 5.0.
Wet and Dry	Precipitation (Chronic) (Reference period 1976-2005; Future period: 2041-2070)	Substantial decreases in precipitation are projected for the summer months, with reductions up to -8.68% for the majority of the country (90th percentile) for the RCP 4.5 scenario and -15.62% for the RCP 8.5 scenario. Meath, however, indicates a change of 0% to -2% and 0% to -4% in the RCP 4.5 and RCP 8.5 scenarios, respectively. Other seasons, and over the full year, show small projected changes in precipitation with an average 2.86% and 4.81% increase over the whole country in the RCP4.5 and RCP8.5 scenarios, respectively. However, the mid-	Percentage increase in annual mean rainfall: 0.5-4% Percentage increase in summer rainfall: 1% to 5% Percentage increase in winter rainfall: 1% to 6%	Percentage increase in annual mean rainfall: 1-8% Percentage change in summer rainfall: -1% to +2% Percentage Increase in winter rainfall: 5% to 15%

IPCC Climate Impact Driver Category	Climate-related Hazard	Summary of Projections for Ireland[21]	Climate Model Simulations for Dublin[22] (RCP4.5 Scenario)	Climate Model Simulations for Dublin[22] (RCP8.5 Scenario)
		century precipitation climate is expected to become more variable with substantial projected increases in both dry periods and heavy precipitation events. The uncertainty of the mean precipitation projections may be partly attributed to the projected increase in the variability of the future Irish precipitation climate, resulting in an increase in both dry periods and heavy rainfall events.		
	Heavy Precipitation Events (Acute) (Reference period 1976-2005; Future period: 2041-2070)	Changes in the occurrence of heavy rainfall events are of particular importance because of the link with flooding. The projections indicate a decrease in the annual number of wet days[26] for the RCP4.5 (mean value -2.42%) and RCP8.5 (mean value -2.61%) scenarios. There is a projected increase in the annual number of very wet days[27], with mean values of 0.54% and 0.74% for the RCP4.5 and RCP8.5 scenarios, respectively.	Projected decrease in the annual number of wet days: -1% to -3.5% *(It is noted that regional details may not be reliable because of a large variability in the ensembles).*	Projected change in the annual number of wet days: -3.5% to 0% *(It is noted that regional details may not be reliable because of a large variability in the ensembles).*
			Projected increase in the annual number of very wet days: 0.5% to 1.5% *(It is noted that regional details may not be reliable because of a large variability in the ensembles).*	Projected increase in the annual number of very wet days: 1% to 3% *(It is noted that regional details may not be reliable because of a large variability in the ensembles).*

[26] A “wet day” is defined as one on which the daily precipitation amount is greater than 20mm.
[27] A “very wet day” is defined as one on which the daily precipitation is greater than 30mm.

IPCC Climate Impact Driver Category	Climate-related Hazard	Summary of Projections for Ireland[21]	Climate Model Simulations for Dublin[22] (RCP4.5 Scenario)	Climate Model Simulations for Dublin[22] (RCP8.5 Scenario)
	Dry Periods (Acute) (Reference Period 1981-2000; Future period: 2041-2060)	To quantify the potential impact of climate change on future drought events, the change in the number of dry periods[28] was analysed. The projections indicate an increase in the annual number of dry periods for the RCP4.5 and RCP8.5 scenarios (mean value ≈16% for both RCPs). The projected increases in dry periods are largest for summer, with "likely" values of +11% and +48% for the RCP4.5 and RCP8.5 scenarios, respectively.	Percentage increase in the number of annual dry periods: 28% Percentage increase in the number of summer dry periods: 30%	Percentage increase in the number of annual dry periods: 28% Percentage increase in the number of annual dry periods: 35%
Wind	Wind Speed and Sea Level Pressure (Chronic) (Reference Period 1981-2000; Future period: 2041-2060)	Mid-century mean 10-m wind speeds are projected to decrease for all seasons. The decreases are largest for summer months under the RCP8.5 scenario. The summer reductions in 10-m wind speed range from 0.3% to 3.4% for the RCP4.5 scenario and from 2% to 5.4% for the RCP8.5 scenario. Annual average mean sea level pressure (MSLP) is projected to increase by the middle of the century for both the RCP4.5 (mean value 1.4hPa) and RCP8.5 scenarios (mean value 1.2hPa). There exists a clear south-east to north-west gradient in the projections, with the largest increases in the north. The projected increases in MSLP are some of many possible factors that could contribute to the projections of	Percentage change in annual mean 10-m wind speed: -2% Change in annual average mean sea level pressure: 1.35 hPa	Percentage change in annual mean 10-m wind speed: -2.5% Change in annual average mean sea level pressure: 1.1 hPa

[28] A dry period is defined as at least 5 consecutive days on which the daily precipitation is less than 1mm.

IPCC Climate Impact Driver Category	Climate-related Hazard	Summary of Projections for Ireland[21]	Climate Model Simulations for Dublin[22] (RCP4.5 Scenario)	Climate Model Simulations for Dublin[22] (RCP8.5 Scenario)
		decreases in wind speed and wind power and increases in dry periods and heatwave events.		
	Storm Track Projections[29] (Acute) (Reference Period 1981-2000; Future period: 2041-2060)	Projections show a reduction of ≈10% in the numbers of less intense storms affecting Ireland and suggest an eastward extension of the more severe windstorms over Ireland and the UK from the middle of the century. It should be noted that because extreme storms are rare events, the storm projections should be considered with a level of caution.		
Snow and Ice	Snowfall (Chronic) (Reference Period 1981-2000; Future period: 2041-2060)	Annual snowfall is projected to decrease substantially by the middle of the century for the RCP4.5 (mean value 52%) and RCP8.5 scenarios (mean value 63%). The largest decreases are noted over low-lying regions. Averaged over the whole country, the "likely" decreases in mid-century snowfall are 51% and 60% for the RCP4.5 and RCP8.5 scenarios, respectively.	Percentage decrease in mean annual in snowfall: -67%	Percentage decrease in mean annual in snowfall: -75%

[29] Given the large societal impacts of extreme storms, there is considerable interest in the potential impact of climate change on extreme cyclonic activity in the North Atlantic. Windstorms and associated high wind speeds are a major source of natural hazard risk for Ireland and many countries across Europe.

IPCC Climate Impact Driver Category	Climate-related Hazard	Summary of Projections for Ireland[21]	Climate Model Simulations for Dublin[22] (RCP4.5 Scenario)	Climate Model Simulations for Dublin[22] (RCP8.5 Scenario)
Other (Energy Impacts)	Heating degree days[30] (Reference period 1976-2005; Future period: 2041-2070)	The projected change in heating degree days (HDDs) shows that by the middle of the century there will be a greatly reduced requirement for heating in Ireland, with HDDs projected to decrease by 12–17% and 15–21% for the RCP4.5 and RCP8.5 scenarios, respectively. A clear north-to-south gradient is evident for both RCP scenarios, with the largest decreases in the south. Averaged over the whole country, the expected decreases in HDDs are 14% and 18% for the RCP4.5 and RCP8.5 scenarios, respectively.	Percentage decrease in mean annual HDD: 15-23%	Percentage decrease in mean annual HDD: 11-20%
	Cooling degree days[31] (Reference Period 1981-2000; Future period: 2041-2060)	The projections show that cooling degree days (CDDs) are expected to slightly increase, particularly over the east and midlands, suggesting a small increase in air conditioning requirements by the middle of the century. However, the amounts are small compared with HDDs and therefore have a negligible effect on the projected changes in the total energy demand.		

[30] A degree day, an estimate of accumulated heat, is defined as the deviation (°C) from a base temperature value. Heating degree days (HDDs) are used by power companies and consumers to estimate the amount of energy required for residential or commercial space heating during the cold season.
[31] Cooling degree days (CDDs) are used to estimate the amount of air conditioning usage during the warm season.

IPCC Climate Impact Driver Category	Climate-related Hazard	Summary of Projections for Ireland[21]	Climate Model Simulations for Dublin[22] (RCP4.5 Scenario)	Climate Model Simulations for Dublin[22] (RCP8.5 Scenario)
	Solar photovoltaic (PV) power (Reference Period 1981-2000; Future period: 2041-2060)	To assess the impacts of climate change on solar power in Ireland, projections of solar photovoltaic (PV) power were analysed. Results show an expected small decrease in PV by the middle of the century ranging from ≈0 to 4%. The largest decreases are noted in the north of the country and for the RCP8.5 scenario.	Percentage decrease in mean annual PV: -0.5% to -1.5%	Percentage decrease in mean annual PV: -0.5% to -3%

3 CLIMATE RISK SCREENING

3.1 Technical Screening Criteria Requirements

For the purposes of the assessment, the methodology outlined in Regulation (EU) 2020/852 of the European Parliament and of the Council (the 'Taxonomy Regulation') and Commission Delegated Regulation (EU) 2021/2139[32] (the 'Supplementing Regulation') for a Climate Risk and Vulnerability Assessment has been adopted.

The 'Supplementing Regulation' establishes the Technical Screening Criteria for '*Substantial contribution to climate change adaptation'* specific to certain economic activities. Annex II, Section 7.1 (2) of the Supplementing Regulation sets out the following criteria for assessing risk on the 'Construction of new buildings' (the Proposed Development at Swords Business Park, Greenfield, Co. Dublin consists of the construction of a mix-use development):

2. *The physical climate risks that are material to the activity have been identified from those listed in Appendix A to this Annex by performing a robust climate risk and vulnerability assessment with the following steps:*

    a. *screening of the activity to identify which physical climate risks from the list in Appendix A to this Annex may affect the performance of the economic activity during its expected lifetime;*

    b. *where the activity is assessed to be at risk from one or more of the physical climate risks listed in Appendix A to this Annex, a climate risk and vulnerability assessment to assess the materiality of the physical climate risks on the economic activity;*

    c. *an assessment of adaptation solutions that can reduce the identified physical climate risk.*

The first step of the climate risk and vulnerability assessment, as set out in Annex II, Section 7.1 (2) (a) of the Supplementing Regulation (and provided above), is the screening of the activity to identify which physical climate risks from the list in Appendix A of Annex II of the Supplementing Regulation may affect the performance of the economic activity during its expected lifetime. These physical climate risks are provided in Table 3-1.

[32] Commission Delegated Regulation (EU) of 4.6.2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives.

Table 3-1: Classification of climate related hazards (Source: Appendix A of Annex II of the Commission Delegated Regulation 2021/2139[33])

	Temperature-related	Wind-related	Water-related	Solid mass-related
Chronic	Changing temperature (air, freshwater, marine water)	Changing wind patterns	Changing precipitation patterns and types (rain, hail, snow/ice)	Coastal erosion
	Heat stress		Precipitation or hydrological variability	Soil degradation
	Temperature variability		Ocean acidification	Soil erosion
	Permafrost thawing		Saline intrusion	Solifluction
			Sea level rise	
			Water stress	
Acute	Heat wave	Cyclone, hurricane, typhoon	Drought	Avalanche
	Cold wave/frost	Storm (including blizzards, dust and sandstorms)	Heavy precipitation (rain, hail, snow/ice)	Landslide
	Wildfire	Tornado	Flood (coastal, fluvial, pluvial, ground water)	Subsidence
			Glacial lake outburst	

The climate risk screening primarily considers the location of the Proposed Development; this allows certain climate-related hazards to be initially excluded from the screening assessment based on location. Climate projections for the area of the Proposed Development along with risk levels as determined by the IPCC AR6 WGI and FCC CAP are then utilised to determine the climate risks which are material to the Proposed Development. Climate risks that are material to the Proposed Development are then subsequently identified from those listed in Table 3-1.

3.2 Risk Identification

3.2.1 Project Site Location

The site covers an area of 2.2 hectares. The site is bounded to the north and west by an access road serving existing industrial/retail parks, to the east by a heavily vegetated embankment leading to the M1 motorway and to the south by an existing public road (L6310).

The site generally slopes towards its centre with downwards gradients ranging between 1 in 30 to 1 in 80 (approximately 3% to 1%).

The Site is located approximately 300m form the Malahide Estuary where the highest tide level is ca. 6 to 7 above ordnance datum (AOD) (Malin).

[33] Appendix 2 of this report contains a copy of Appendix A of Annex II of the Supplementing Regulation.

A Site Investigation Report was carried out for the Site which investigated subsurface conditions utilising a variety of investigative methods in accordance with the project specification.

The full details of the strata encountered during the ground investigation are provided in Appendix 11.7 of the Engineering Infrastructure Report.[34]

The topography of the Site and surrounding area is not be prone to landslide risk.

A Flood Risk Assessment (FRA)[35] has been carried out for the Proposed Development which considers the potential flood mechanisms at the Site. This Report has been considered for the purposes of the CCIA in order to determine overall flood risk at the site, and the adequacy of proposed measures.

Tidal Flooding is caused by elevated sea levels or overtopping by wave action. The site is located approximately 6km inland from the Irish Sea and the site levels exceed the highest ever recorded or projected tide in the area. Reference was made to the available Fingal East Meath FRAM (CFRAM) Study maps, to the Fingal County Council County Development Plan Flood Zone Mapping and to the National Costal Flood Hazard Mapping (NCFHM). Based review of that mapping it is evident that the Costal (and Fluvial) flood extents up to and including the 0.1% (1 in 1000 year) AEP (Annual Exceedance Probability) events do not extend to the subject site. Based on this there is a low risk of Tidal flooding on the site.

Reference to the EPA mapping website identifies a historical watercourse crossing the site known as the “Gaybrook”. It is noted that this mapping is inaccurate as the watercourse was diverted c.30 years ago into a 900mm S/W pipeline laid parallel to the eastern site boundary. The existing ditch remains “dry” with no upstream flows entering the site. This has been confirmed by both topographical survey, visual inspection and CCTV survey (Roger Mullarkey & Associates, 2026). Appendix A of the FCC CDP “Strategic Flood Risk Assessment” shows the site as unaffected by flooding and is considered within “Flood Zone C”.

Site walkovers were undertaken for the site in varying weather conditions, which showed no evidence of a water table present at the site. Additionally, finished floor levels of buildings on the site are to be constructed above the ground level and above the adjacent roads. Therefore, according to the above finding, it was concluded that the site is not at risk (i.e., low risk) of flooding from groundwater.[36]

Pluvial flooding occurs due to insufficient capacity in the local drainage network system which results in overland flows as well as the ponding of water in topographically low points. It is usually associated with high intensity rainfall. Due to the predicted increase in the frequency and intensity of extreme rainfall events, it is prudent that site specific drainage and management measures aimed at mitigating the effects of pluvial flooding are incorporated into the development design. Careful consideration has been given to the overall site design to manage the potential generation of surface water run-off by the Proposed Development. Proposed mitigation measures to reduce risk of pluvial flooding will be implemented and are discussed in detail in Table 4-1 of this Report.

[34] Engineering Infrastructure Report & Stormwater Impact Assessment, Roger Mullarkey & Associates, April 2026
[35] Site Specific Flood Risk Assessment, Roger Mullarkey & Associates, April 2026.
[36] Site Specific Flood Risk Assessment, Roger Mullarkey & Associates, April 2026.

There are flood risks associated with misuse, neglect, damage, intervention or lack of intervention attributable to mechanical failure or human error. Such a risk can be caused by blockages in piped systems or lack of maintenance of mechanical devices. The correct operation and maintenance of the drainage system is necessary to reduce the risk of human or mechanical error causing pluvial flood risk from blockage. The storm water network will be maintained regularly as part of the Proposed Development's operational plan and procedure and a number of maintenance measures have been outlined within the Engineering Infrastructure Report.[37] These measures have also been considered in Table 4-1 of this report.

To prevent the risk of pluvial flooding due to overland flow in extreme rainfall events, the drainage network is to be designed in accordance with the applicable regulations e.g., Greater Dublin Strategic Drainage Study (GDSDS) and to take account of flood exceedance for storms with return periods exceeding 1% AEP (Annual Exceedance Probability). This is detailed in Table 4-1 of this report.

Based on a review of the Proposed Development Site location, the following potential climate-related hazards, as listed in Table 3-1, can be excluded from the screening assessment:

- **Sea level rise:**

  - Due to the elevation of the Site and its position above sea level, it is not expected to be affected by sea level rise.[38]

- **Temperature-related:** permafrost thawing; wildfire.

  - The Site is located close to an urban setting; therefore, highly unlikely to be affected by wildfires. Permafrost is not relevant to the Irish climate.

- **Wind-related:** tornado.

  - It is possible that thunderstorms with conditions favourable for tornado events and warmer, unstable weather attributed to climate change may be linked. On average, Ireland experiences ten tornadoes per year although many of these are weak and often occur without being noticed. There have been more reports of tornadoes in Ireland in recent years, some of which have caused considerable damage to buildings and local infrastructure. This may indicate that the risk of more powerful tornadoes in Ireland is rising, however there currently lacks tangible evidence on this subject. Therefore, tornado is currently excluded as a material risk.

- **Solid mass-related:** soil degradation; soil erosion; solifluction; avalanche; landslide; subsidence**.**

  - In relation to soil degradation and soil erosion, there will be unavoidable loss of in—situ soil and subsoil from the Proposed Development Site to achieve the required formation levels for the Proposed Development including building foundations, roads,

[37] Engineering Infrastructure Report & Stormwater Impact Assessment, Roger Mullarkey & Associates, April 2026
[38] Climate Central - Coastal Risk Screening Tool

drainage, and other infrastructure. All excavated soil and subsoil material will be reused on Site for engineering fill and landscaping, subject to suitability testing, as much as practicable.

- Due to the use of appropriate foundations, the Site will not be prone to subsidence.
- Due to the location and topography of the Site, solifluction has been excluded in the long-term.
- According to the Landslide Susceptibility Map developed by Geological Survey Ireland (GSI), the Proposed Development Site is considered Low in terms of landslide susceptibility.[39]
- Avalanches are not considered relevant based on Ireland's historical and future projected climate.

3.2.2 IPCC AR6 WGI Climate Impact Drivers and Confidence in Future Changes for Northern Europe and Ireland

The IPCC WGI has developed an Interactive Atlas to demonstrate Climatic impact-drivers (CIDs) predictions across the globe. CIDs are physical climate system conditions (e.g., means, events, extremes) that affect an element of society or ecosystems. Depending on system tolerance, CIDs and their changes can be detrimental, beneficial, neutral, or a mixture of each across interacting system elements and regions. CID types include heat and cold, wet and dry, wind, snow and ice, coastal and open ocean.

Chapter 12 of IPCC AR6 WGI surveys the links between CIDs and affected sectors and provides a matrix of CIDs for regional sectors that are rated based on their potential impact and risk relevance. Impacts, risks, and opportunities are rarely attributable to a single CID index or threshold, but climate shifts that push conditions outside of expected conditions and beyond tolerance levels are indicative of impact, risk or benefit given vulnerability and exposure. Focus is on direct sectoral connections of a CID rather than cascading or secondary effects. Within each sector there is a multitude of specific sectoral systems that may be affected by CID increases and decreases, with consequences further distinguished by region, background climate and socio-economic or ecological context of the affected asset.

The Proposed Development falls within the sector of the "Built Environment" as per IPCC AR6 WGI. Therefore, CIDs and their associated impact/risk relevance for the Built Environment have been provided in Table 3-2:

Table 3-2: Impacts and Risk Relevance for the "Built Environment".

Category	CIDs	Impacts and Risk Relevance
HEAT AND COLD	Mean air temperature	High
	Extreme heat	High
	Cold spell	Low/moderate

[39] Geological Survey Ireland - Landslide Susceptibility Map

Category	CIDs	Impacts and Risk Relevance
	Frost	None/low confidence
WET AND DRY	Mean precipitation	None/low confidence
	River flood	High
	Heavy precipitation and pluvial flood	High
	Landslide	Low/moderate
	Aridity	None/low confidence
	Hydrological drought	None/low confidence
	Agricultural and ecological drought	Low/moderate
	Fire weather	Low/moderate
WIND	Mean wind speed	None/low confidence
	Severe windstorm	High
	Tropical cyclone	High
	Sand and dust storm	Low/moderate
SNOW AND ICE	Snow, glacier and ice sheet	None/low confidence
	Permafrost	Low/moderate
	Lake, river and sea ice	None/low confidence
	Heavy snowfall and ice storm	Low/moderate
	Hail	Low/moderate
	Snow avalanche	Low/moderate
COASTAL AND OCEANIC	Relative sea level	High
	Coastal flood	High
	Coastal erosion	High
	Marine heatwave	None/low confidence
	Ocean acidity	None/low confidence
OTHER	Air pollution weather	None/low confidence
	Atmospheric CO_2 at surface	None/low confidence
	Radiation at surface	Low/moderate

The CIDs, and confidence in future changes of climate for Northern Europe are demonstrated in Table 3-3:

Table 3-3: IPCC WGI Interactive Atlas: Regional synthesis Climate Change Predictions for Northern Europe

Category	CIDs	Future Changes	
HEAT AND COLD	Mean surface temperature	High confidence of increase	△
	Extreme heat	High confidence of increase	△
	Cold spell	High confidence of decrease	▽
	Frost	High confidence of decrease	▽
WET AND DRY	Mean precipitation	High confidence of increase	△
	River flood	Medium confidence of decrease	▽
	Heavy precipitation and pluvial flood	High confidence of increase	△
	Landslide	Low confidence in direction of change	—
	Aridity	High confidence of decrease	▽
	Hydrological drought	Low confidence in direction of change	—
	Agricultural and ecological drought	Low confidence in direction of change	—
	Fire weather	Low confidence in direction of change	—
WIND	Mean wind speed	Medium confidence of decrease	▽
	Severe windstorm	Medium confidence of increase	△

Category	CIDs	Future Changes	
	Tropical cyclone	Not relevant	✖
	Sand and dust storm	Not relevant	✖
SNOW AND ICE	Snow, glacier and ice sheet	High confidence of decrease	▽
	Permafrost	High confidence of decrease	▽
	Lake, river and sea ice	High confidence of decrease	▽
	Heavy snowfall and ice storm	Low confidence in direction of change	—
	Hail	Low confidence in direction of change	—
	Snow avalanche	Low confidence in direction of change	—
COASTAL AND OCEANIC	Relative sea level	High confidence of increase	△
	Coastal flood	High confidence of increase	△
	Coastal erosion	High confidence of increase	△
	Marine heatwave	High confidence of increase	△
	Ocean acidity	High confidence of increase	△
OTHER	Air pollution weather	Low confidence in direction of change	—
	Atmospheric CO_2 at surface	High confidence of increase	△
	Radiation at surface	Medium confidence of decrease	▽

The Proposed Development is located in Swords Business Park, Greenfield, Co. Dublin. The CIDs and predicted changes in future climate for Dublin are presented in Table 3-4 below, as adapted from the findings in Table 2-2 of this Report:

*Table 3-4: Climate Change Predictions for **Dublin** (based on Climate Ireland Climate Change Projection Maps)*

Category	CIDs	Future Changes
HEAT AND COLD	Mean surface temperature	Predicted increase
	Extreme heat	Predicted increase
	Cold spell	Predicted decrease
	Frost	Predicted decrease
WET AND DRY	Mean precipitation	Predicted increase
	River flood	Predicted increase
	Heavy precipitation and pluvial flood	Predicted increase
	Hydrological drought	Predicted increase
	Agricultural and ecological drought	Predicted increase
WIND	Mean wind speed	Predicted decrease
	Severe windstorm	Predicted increase
SNOW AND ICE	Snow, glacier and ice sheet	Predicted decrease
	Heavy snowfall and ice storm	Predicted decrease

Category	CIDs	Future Changes
COASTAL AND OCEANIC	Relative sea level	Predicted increase
ENERGY IMPACTS (OTHER)	Heating degree days	Predicted decrease
	Cooling degree days	Predicted increase
	Solar photovoltaic (PV) power	Predicted decrease

3.2.3 Fingal County Council Climate Action Plan (2024-2029) Risk Statement

In Fingal, climate change is posing challenges in many ways, from the increased frequency of uncontrolled gorse fires, increased incidents of flooding, and imposition of water restrictions during heatwaves. This section provides an assessment of climate change risks and impacts for Fingal, as set out within the Fingal County Council Climate Action Plan (2024-2029) (FCC CAP).

A Climate Change Risk Assessment (CCRA) is the methodology that was used in this CAP to assess past climatic and extreme weather-related events in Fingal and develop a climate impact baseline from which future impacts can be predicted. The period of past climatic and weather-related events studied was 1982–2023.

A profile of climate hazards was developed and used to consider future risks that may affect Fingal, establishing their frequency, their intensity and identifying specific areas of Fingal that are most vulnerable. This is a qualitative assessment from which adaptation actions were identified which reduce / mitigate and manage these risks.

For each of the hazard types that have been identified, an assessment of their current frequency has been conducted. The final assessment of the frequency is shown in the table below:

Hazard Type	Current Frequency
Heatwave	Common
Drought	Occasional
Cold spell	Common
Heavy snowfall	Occasional
Severe windstorm	Very Frequent
Pluvial Flood	Frequent
River Flood	Common
Coastal Flooding	Frequent
Coastal Erosion	Common
Groundwater Flood	Rare

Figure 3-1 FCC Climate Hazards (Source: FCC CCRA)

According to the FCC CAP, the potential impacts of future risks from climate change will be increased by the socio-economic and demographic growth that the County is expected to

undergo in the future. The increasing risk from climate change will have an impact on the County in terms of people and communities affected including damage and disruption to assets and the economy.

Projected changes in levels of hazard, exposure, and vulnerability, combine to form an assessment of future climate risks for FCC. The risk matrix in Figure 3-2 shows the future change in risk with the hollow dot showing the current risk and the solid dot the future risk. The dashed line shows the change between the current and future risk.

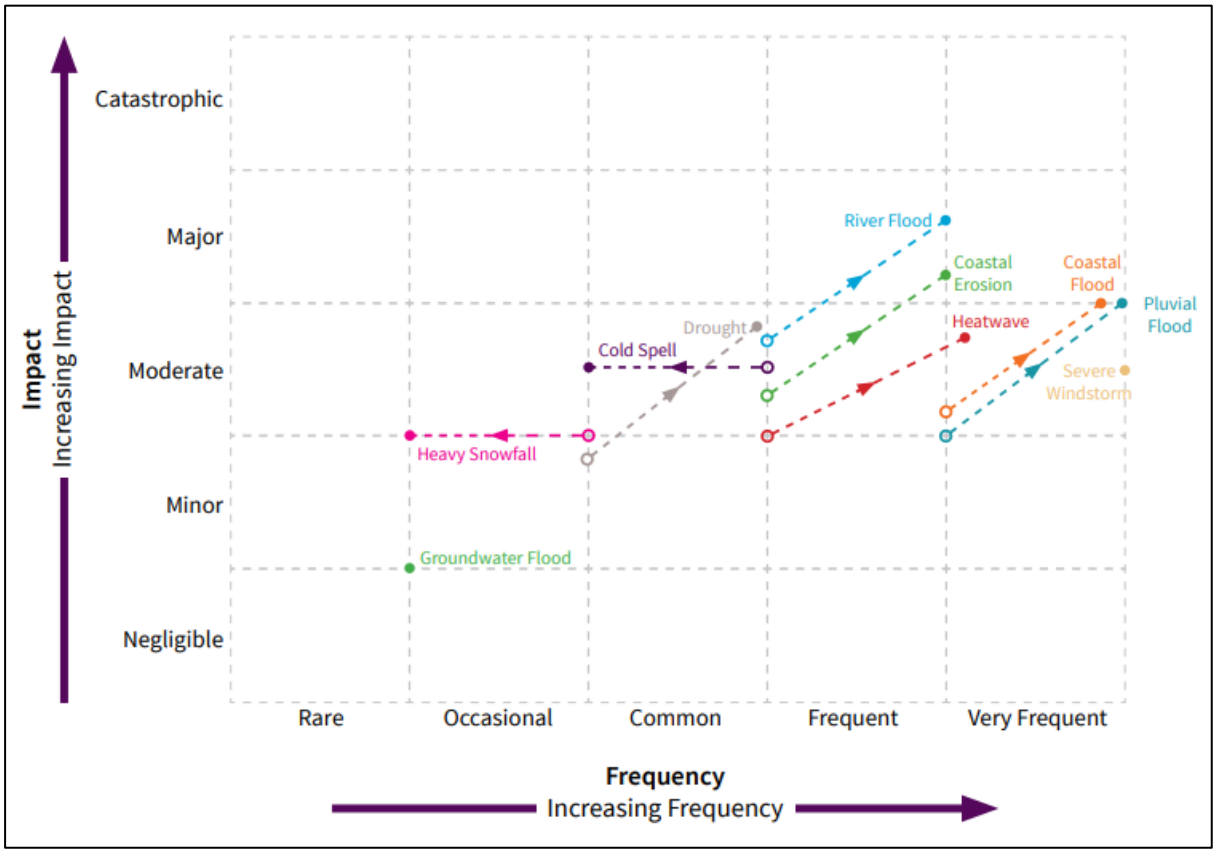

Figure 3-2 Risk matrix showing the future changes in risk for the identified hazards within Fingal County (Source: FCC CAP)

As illustrated in the climate risk matrix (Figure 3-2), projections indicate that the risks associated with existing hazards such as river, pluvial, and coastal flooding are projected to increase in the future as a result of projected increases in the frequency of hazard events and also due to an increase in the areas, assets and populations exposed to these hazards.

Heatwaves and droughts although already experienced in Fingal, are expected to occur more frequently and with a greater impact on Fingal in the future. The impact is exacerbated by not only projected changes in frequency of occurrence of heatwaves but also as a result of projected increases in population and the proportion of population considered vulnerable (those aged 65 years and over). These hazards can therefore be considered as emerging risks for the region.

Although the frequency and impact of severe windstorms is thought to be unchanged in the future, these events will remain a risk for Fingal. The impact of heavy snowfall and cold spells

on Fingal remains, however, due to projected decreases in hazard frequency, the overall risk of these hazards is likely to reduce in the future, resulting in a decreased level of risk. Groundwater flooding is also thought to be unchanged in the future

The following Table 3-5 has been adapted from the FCC CAP and identifies future climate hazards and their frequency:

Figure 3-3 Climate Risk Identification (Adapted from FCC CAP)

Climatic Hazard	Future Frequency	Climate Projection	Risk Statement
Coastal flooding	Very frequent	Projections of sea level under a high emissions scenario indicate an increase of up to 0.24m by 2050 which will increase the frequency of coastal inundation. A rising sea level is strongly linked with coastal erosion and an increase in erosion rates and extent.	Coastal flooding and erosion already pose a significant risk for Fingal and have resulted in the inundation of assets, damage to protected and important species and habitats, and disruption of transport routes. Erosion at the Burrow, Portrane has been a concern for a number of decades. Rising sea levels will increase the frequency and extent of coastal inundation across Fingal. The risk associated with coastal erosion is also projected to increase as a result of sea level rise.
Coastal erosion	Frequent		
Severe windstorms	Very frequent	Projections of storms are subject to a high level of uncertainty. By mid century, projections indicate that average wind speed will remain similar to those currently experienced. There is limited evidence of a potential increase in the frequency of more intense storms which are currently rare events. However, more research is needed to confirm this increase.	Severe windstorms are currently experienced very frequently across Fingal and result in wide-ranging impacts, including damage to power and communication infrastructure, disruption to transport networks and damage to trees. Projections indicate no significant change in the level of risk associated with windstorms.
River flooding	Frequent	Projections indicate an increase in the frequency of heavy rainfall days (days with precipitation >30mmm) for Fingal with some areas projected to see an increase of up to 17%. This will likely result in an	Recent experiences of river and pluvial flooding events in 2020 and 2021 resulted in the inundation of residential properties, damages to commercial buildings and premises, and disruption of transport networks. Projected increases in the frequency of extreme

Climatic Hazard	Future Frequency	Climate Projection	Risk Statement
Pluvial flooding	Very frequent	increased frequency of associated river and pluvial flooding.	precipitation events will result in increased surface water and riverine flood risk for Fingal.
Heatwave	Frequent	Projections indicate an overall increase in average temperature of between 1.2 and 1.6°C for Fingal relative to the 1981-2000 period. Under a high emission scenario, projections indicate that heatwaves will become more frequent by mid-century. Summer rainfall is expected to reduce in the future when compared to the baseline period of 1981-2000, in both the RCP4.5 and RCP8.5 scenario contributing to potential drought conditions.	Fingal experienced both a heatwave and drought in 2018, while a heatwave was also recorded in 2022. These events resulted in an increased frequency of uncontrolled fires and associated emergency response, increased demand on water resources and on the provision of services at key recreational sites (e.g. traffic management). Projected increases in the frequency of heatwaves and drought conditions will mean that events currently experienced on an infrequent basis will become more frequent.
Drought	Common		
Cold spells	Occasional	As a consequence of the increasing temperatures, a decrease in the number of frost days and ice days in the 2041-2060 future period is projected when compared with the baseline period of 1981-2000, for both the RCP4.5 and RCP8.5 scenario.	Recent experiences of cold spells and heavy snowfall events in 2018 (e.g. Storm Emma) and 2022, demonstrated the wide range of impacts for Fingal. These included, amongst others, road closures, disruption to public transport, power outages, an increase in the frequency of trips and falls, and impacts on water resources (restricted water supply during storm Emma). Projected increases in average tem-

Climatic Hazard	Future Frequency	Climate Projection	Risk Statement
Heavy snowfall	Rare	The annual snowfall in the region is projected to decrease substantially by the middle of the century for the RCP 4.5 and RCP8.5 scenarios.	perature and decreases in the frequency of snowfall indicate a decrease in the frequency of cold spells, heavy snowfall, and their associated impacts.
Groundwater flooding	Rare	Projections of changes in groundwater flooding are currently not available, therefore there is uncertainty in the change in groundwater flooding frequency that can be expected.	**Groundwater flooding** is currently experienced rarely in the County with limited impacts such as damage to roads and transport disruption.

3.2.4 Identified Climate Risks

The CIDs, and confidence in future changes of climate for Northern Europe, as presented in IPCC AR6 WGI, have been taken into consideration along with the location of the Proposed Development, projected changes in climate for Ireland, and future climate risk levels as determined within the FCC CAP, in order to determine what risks are material to the Proposed Development.

Based on these findings, as presented in Table 3-2 to Table 3-5, the following Table 3-6 indicates the CIDs of relevance to the Proposed Development. Only CIDs which have been assigned as low/moderate or high in IPCC AR6 WGI findings for the “Built Environment” have been included here; anything that has been assigned none/low confidence has been omitted (aside from hydrological drought which is considered relevant to the site location). This approach ensures that the assessment is based on reliable and robust data. Many of these CIDs that have been omitted due to ‘none/low confidence’ risk relevance are not applicable to the subject site location (as can be seen in table 3-2). The only potentially relevant CIDs which have been omitted are mean precipitation and mean wind speed. Impacts from these will be captured in the assessment of acute hazards such as heavy rainfall or storm winds.

Table 3-6: Climate Risk Screening

Category	CIDs	IPCC Impacts and Risk Relevance to the Built Environment	Predicted Change in CID for Northern Europe and Ireland (Dublin)	Included in FCC CAP	Material Risk
HEAT AND COLD	Mean air temperature (chronic)	High	High confidence of increase in Northern Europe. Projections for Dublin indicate an increase in mean air temperature.	Yes	**Yes**
	Extreme heat (acute)	High	High confidence of increase in Northern Europe. Projections for Dublin indicate an increase in heatwaves.	Yes	**Yes**
	Cold spell (acute)	Low/moderate	High confidence of decrease in Northern Europe. Projections for Dublin indicate a decrease in cold spells.	Yes	**No**
WET AND DRY	River flood (acute)	High	Medium confidence of decrease for Northern Europe. Very wet days predicted to increase in Dublin.	Yes	**Yes**
	Heavy precipitation and pluvial flood (acute)	High	High confidence of increase for Northern Europe. Very wet days predicted to increase in Dublin.	Yes	**Yes**
	Landslide (acute)	Low/moderate	Low confidence in direction of change. the Proposed Development Site is Low in terms of landslide susceptibility.	No	**No**
	Hydrological Drought[40] (acute)	None/low confidence	Low confidence in direction of change for Northern Europe. Number of dry periods expected to increase in Dublin.	Yes	**Yes**

[40] Though this has been assigned as none/low confidence by the IPCC in terms of impacts and risk relevance to the built environment, climate predictions for Ireland indicate an increase in the frequency and duration of droughts. Therefore, this CID has not been omitted from the current risk screening.

Category	CIDs	IPCC Impacts and Risk Relevance to the Built Environment	Predicted Change in CID for Northern Europe and Ireland (Dublin)	Included in FCC CAP	Material Risk
	Agricultural and ecological drought (acute)	Low/moderate	Low confidence in direction of change.	No	**No**
	Fire weather (acute)	Low/moderate	Low confidence in direction of change.	No	**No**
WIND	Severe windstorm (acute)	High	Medium confidence of increase in Northern Europe. Increase in windstorms projected for Ireland with level of caution for uncertainty.	Yes	**Yes**
	Tropical cyclone (acute)	High	Not relevant for location.	No	**No**
	Sand and dust storm (acute)	Low/moderate	Not relevant for location.	No	**No**
SNOW AND ICE	Permafrost thawing (chronic)	Low/moderate	Not relevant for location.	No	**No**
	Heavy snowfall and ice storm (acute)	Low/moderate	Low confidence in direction of change for Northern Europe. Projections for Dublin predict a decrease in snowfall.	Yes	**No**
	Hail (acute)	Low/moderate	Low confidence in direction of change.	No	**No**
	Snow avalanche (acute)	Low/moderate	Not relevant for location.	No	**No**
COASTAL & OCEANIC	Relative sea level (chronic)	High	High confidence of increase in Northern Europe. A 6-7mm rise per year in Dublin Bay was recorded between the years 2000 and 2016.	Yes	**No**
	Coastal flood (acute)	High	High confidence of increase in Northern Europe. Due to the location of the site and proximity to the coast, the SSFRA does not consider coastal flooding to be a risk to the Proposed Development.	Yes	**No**

Category	CIDs	IPCC Impacts and Risk Relevance to the Built Environment	Predicted Change in CID for Northern Europe and Ireland (Dublin)	Included in FCC CAP	Material Risk
	Coastal erosion (chronic)	High	High confidence of increase in Northern Europe. Due to the location of the site and proximity to the coast, coastal erosion is not considered to be a risk to the Proposed Development.	Yes	**No**
OTHER	Radiation at surface (chronic)	Low/Moderate	Medium confidence of decrease in Northern Europe. The Radon Map for Ireland indicates that the Application Site is not located within a High Radon Area, therefore there is no legal requirement to conduct a radon test. However, a radon test is recommended by the EPA.	No	**Yes**
	Compound flooding	High	The probability of these events is projected to increase along northern European coasts	No	**Yes**

Taking account of the findings presented in Table 3-2 to Table 3-6, the physical climate risks from the list in Appendix A of Annex II of the Supplementing Regulation (as provided in Table 3-1) which may affect the performance of the economic activity during its expected lifetime have been revised in terms of relevancy to the Proposed Development. Table 3-7 presents the physical climate risks which have been deemed relevant to the Proposed Development (highlighted) and those which have been excluded (strikethrough):

Table 3-7: Classification of climate related hazards which are relevant to the Proposed Development

	Temperature-related	Wind-related	Water-related	Solid mass-related
Chronic	Changing temperature (air, freshwater, marine water)	~~Changing wind patterns~~	~~Changing precipitation patterns and types (rain, hail, snow/ice)~~	~~Coastal erosion~~
	~~Heat stress~~		~~Precipitation or hydro-logical variability~~	~~Soil degradation~~
	~~Temperature variability~~		~~Ocean acidification~~	~~Soil erosion~~
	~~Permafrost thawing~~		~~Saline intrusion~~	~~Solifluction~~
			~~Sea level rise~~	
			~~Water stress~~	
Acute	Heat wave	~~Cyclone, hurricane, typhoon~~	Drought	~~Avalanche~~
	~~Cold wave/frost~~	Storm (including blizzards, dust and sandstorms)	Heavy precipitation (rain, hail, snow/ice)	~~Landslide~~
	~~Wildfire~~	~~Tornado~~	Flood (coastal, fluvial, pluvial, ground water)	~~Subsidence~~
			~~Glacial lake outburst~~	

4 CLIMATE RISK AND VULNERABILITY ASSESSMENT

4.1 Technical Screening Criteria Requirements

In accordance with the methodology as outlined in Annex II, Section 7.1 (2) (a) of the Supplementing Regulation, Section 3 of this Report has screened the activity to identify which physical climate risks from the list in Appendix A of Annex II of the Supplementing Regulation may affect the performance of the economic activity during its expected lifetime.

The remaining steps, as set out in Annex II, Section 7.1 (2) of the Supplementing Regulation (and provided above), are to conduct a climate risk and vulnerability assessment to assess the materiality of the physical climate risks on the economic activity and assess the adaptation solutions that can reduce the identified physical climate risk. This has been completed using the IPCC framework on the assessment of risk and is detailed in the following sections.

4.2 Climate Risk and Vulnerability Assessment Framework

The IPCC provides a framework to assess risk. This framework evaluates risks which may emerge due to the overlap of Climate Hazards, Vulnerability, and Exposure[41].

Figure 4-1: IPCC (AR6) Risk Assessment Propeller

[41] IPCC (2022) Working Group II Contribution to the Sixth Assessment Report (AR6), Climate Change 2022: Impacts, Adaptation and Vulnerability.

Section 3 (Climate Risk Screening) identified the following Climate Hazards as posing a potential risk to the Proposed Development:

- Temperature (chronic)
- Temperature (acute)
- Precipitation (acute)
- Drought (acute)
- Wind (acute)
- Compound events (acute)

Table 4-1 below evaluates these Climate Hazards, the risk factors (Exposure), the current sensitivity and adaptive capacity of the development (Vulnerability), and the subsequent risk level. Adaptation solutions that can reduce the identified physical climate risk have been assessed and any further recommendations for additional adaptation and mitigation measures which may improve the Proposed Development's resilience to climate change impacts are also noted and will be applied.

Table 4-1: Risk and Vulnerability Assessment

IPCC CID Category	Climate Hazard	Risk Factor (Exposure)	Current Sensitivity and Adaptive Capacity of Development (Vulnerability)	Risk with Existing Adaptation Measures	Proposed Additional Adaptation/Mitigation Measures
WET AND DRY	**Temperature (chronic)** *Increase in mean annual air temperature* **Temperature** **(acute)** *Increase in frequency and duration of heatwave events*	Increased cooling days for the buildings, extra power usage.	Due to factors such as climate change, population increase, and construction of high-rise buildings there has been an increase in high internal temperatures Landscaping and the use of trees and plants will shade and contribute to the cooling of the air through evapotranspiration[42]. The building services strategy for the development has been considered in terms of Part L Compliance (NZEB)[43]. A number of low energy technologies are being considered for the development. The Heating Ventilation Air Conditioning (HVAC) system design has been considered to ensure minimal energy requirements in the development. The proposed HVAC systems will be selected based upon their efficiency performance, which has been assessed	Low Risk once existing proposed measures are implemented.	Inspection and maintenance of the PV solar panels and HVAC systems (if implemented) will be carried out periodically and completed in accordance with good practice.

[42] Evapotranspiration is a term used to refer to the combined processes by which water moves from the earth's surface into the atmosphere.

[43] Refer to Building Lifecycle Report, MCORM, 2026

IPCC CID Category	Climate Hazard	Risk Factor (Exposure)	Current Sensitivity and Adaptive Capacity of Development (Vulnerability)	Risk with Existing Adaptation Measures	Proposed Additional Adaptation/Mitigation Measures
			to ascertain their coefficient performance in terms of heating, cooling, and hot water generation. The passive measures included in the design, such as minimising solar gain (glazing selection), reducing the fabric heat loss through the building envelope by improving the airtightness significantly contributes towards reducing the loads on the active systems within the building. The active measures have been designed to reduce the primary energy consumption through intelligent control and highly efficient plant and equipment. The following passive and active measures are being considered for the development: **1. Building Fabric and Passive Design** **High Insulation Standards**: External walls, roofs, floors, and windows are designed with low U-values (e.g. walls at 0.18 W/m²K), reducing heat transfer and helping maintain indoor comfort during hot spells. **Airtightness and Thermal Bridging**: The dwellings are designed to achieve 3 air changes per hour or better, with minimal thermal bridging (0.08), limiting unwanted heat gain or loss. **Passive Solar Consideration**: The layout maximises daylight while managing solar gain to prevent overheating. Glazing is selected to balance light, insulation, and solar control. **2. Lighting and Internal Heat Management** **LED Lighting**: LED fittings will be preferred as far as practical, which emit less heat than traditional bulbs, reducing internal heat load and the risk of overheating in summer. **3. Ventilation and Indoor Air Quality**		

IPCC CID Category	Climate Hazard	Risk Factor (Exposure)	Current Sensitivity and Adaptive Capacity of Development (Vulnerability)	Risk with Existing Adaptation Measures	Proposed Additional Adaptation/Mitigation Measures
			Heat Recovery Ventilation (HRV): Each unit includes HRV systems that provide fresh air while recovering heat from exhaust air. This ensures good air quality and reduces humidity, which is important during warmer periods. **4. Renewable and Low-Carbon Energy Systems** **Heat Pumps**: Air-to-water heat pumps are proposed for hot water and space heating. These are efficient in warm weather and can operate on night-rate electricity, reducing peak demand and supporting grid stability. **5. Electric Vehicle (EV) Infrastructure** **EV Charging Strategy**: Within the external parking areas, ducting shall be provided from a local landlord distribution board to parking spaces. This will enable the company to install several E-car charging points to cater for E-car demand of the residents. Providing the option of E-car charging points will allow occupants to avail themselves of the ever-improving efficient electric car technologies. **6. Material Choices and Thermal Comfort** **Window Frames**: uPVC frames are preferred over aluminium due to better insulation and lower embodied energy. They also reduce sound transmission and require less maintenance, which is beneficial in coastal environments.		
	Precipitation (acute) *Increase in heavy precipitation and pluvial flood*	Pressure on drainage systems.	The lowest FFL is set to be constructed above the ground level and above adjacent roads.[44] **Surface Water Drainage Design**	Low Risk once existing proposed measures are implemented.	No additional measures proposed. A programme of maintenance measures has been detailed

[44] Site Specific Flood Risk Assessment, Roger Mullarkey & Associates, April 2026.

IPCC CID Category	Climate Hazard	Risk Factor (Exposure)	Current Sensitivity and Adaptive Capacity of Development (Vulnerability)	Risk with Existing Adaptation Measures	Proposed Additional Adaptation/Mitigation Measures
			Catchment Division: The subject site does not straddle active surface water catchments. A historic watercourse (Gaybrook) is shown on legacy mapping as crossing the site; however, this watercourse was diverted approximately 30 years ago and now flows within an existing 900 mm diameter surface water culvert running parallel to the eastern site boundary. The residual open ditch within the site is dry, with no upstream inflows, as confirmed by topographical survey, site walkovers, and CCTV inspection. Consequently, there is no overland flow transfer between sub-catchments across the site, and all surface water runoff from the proposed development will be managed internally via the proposed attenuated drainage system prior to controlled discharge into the existing 900 mm culvert at the northeast corner of the site. **Greenfield Runoff Rate**: Outflows are restricted to greenfield runoff rates Qbar at a maximum of 6.24/s, as determined from the recommended HR Wallingford online assessment tool. The Qbar rate was determined based on the site topography, soil conditions and drained site area.[45] **Attenuation Storage**: Combined Total Storage: >562 m³, designed to accommodate a 1-in-100-year storm event with a 20% climate change allowance. **Flow Control**: Hydro-Brake® or similar flow control devices are installed at each outfall to restrict discharge rates and manage stormwater volumes. **Sustainable Urban Drainage Systems (SuDS)**		in the Engineering Assessment Report. It will be the responsibility of the site management team to ensure the drainage system is maintained. Maintenance and cleaning of gullies, manholes (including catch pits) and all other SuDS features will ensure adequate performance.

[45] Site Specific Flood Risk Assessment, Roger Mullarkey & Associates, April 2026.

IPCC CID Category	Climate Hazard	Risk Factor (Exposure)	Current Sensitivity and Adaptive Capacity of Development (Vulnerability)	Risk with Existing Adaptation Measures	Proposed Additional Adaptation/Mitigation Measures
			The SuDS strategy is comprehensive and layered, in accordance with Fingal County Council requirements, the Greater Dublin Regional Code of Practice for Drainage Works, and the CIRIA SuDS Manual (C753): **Water Butts**: Installed at each residential unit to intercept roof runoff for reuse in gardening and washing. **Permeable Pavement**: Used in on-curtilage parking areas to allow infiltration and temporary storage. **Swales**: Grass swales with infiltration trenches are integrated along internal roads to promote infiltration and conveyance. **Detention Basins**: Aboveground grass basins with underground storage tanks provide attenuation and slow discharge to the receiving watercourse. **Petrol Interceptors**: Installed downstream of flow control devices to treat runoff before discharge. The incorporation of SuDS elements will provide a sustainable manner in which to disperse surface water from the site, encourage groundwater recharge and provide treatment of run-off and subsequent improvement of discharge quality. Refer to the Engineering Assessment Report for more detail on the drainage design and each of the above-listed SuDS measures which have been taken into account in the preparation of this document[46]. **Design for Climate Resilience** **Stormwater Calculations**: Designed for 1-in-100-year storm events with an additional 20% allowance for climate change		

[46] Engineering Infrastructure Report & Stormwater Impact Assessment, Roger Mullarkey & Associates, April 2026.

IPCC CID Category	Climate Hazard	Risk Factor (Exposure)	Current Sensitivity and Adaptive Capacity of Development (Vulnerability)	Risk with Existing Adaptation Measures	Proposed Additional Adaptation/Mitigation Measures
			Soil Classification: Site soils classified as Type 3 (moderate infiltration), ensuring conservative design assumptions **Simulation and Modelling**: Extensive hydraulic modelling using FSR methodology and Colebrook-White formula to size pipes and storage		
	Drought (acute) *Increase in the number of dry periods*	Potential disruption to residential water supply. Increase use of water for the irrigation of the landscaping.	Water supply is on the public water mains, so disruptions should be minimised and mitigated by Uisce Éireann.	Low risk to building. Moderate risk to irrigation of landscaping.	Consider installation of rainwater harvesting.
WIND	**Wind (acute)** Potential increase in the number of windstorms	Potential for damage to infrastructure and telecommunications, and a risk to human health	Suitable exterior materials are proposed for the development, and a Planned Preventative Maintenance (PPM) programme will be implemented to ensure all external elements remain safe and fit for purpose. Materials have been selected for their durability and long service life, with consideration given to their performance under environmental stressors such as wind-driven rain and weathering. The report outlines that pitched roofs with concrete tiles, metal cladding, uPVC rainwater systems, and precast concrete elements have been chosen for their resilience, low maintenance requirements, and long lifespans—ranging from 40 to over 80 years. The design and specification of these components are informed by best practice principles, including regular inspection regimes and maintenance schedules to extend material longevity. The report specifically outlines BS 7543:2015 and its annexes, it aligns with its principles by detailing lifecycle expectations,	Low Risk once existing proposed measures are implemented, and landscaping is maintained in place as designed.	No additional measures proposed.

IPCC CID Category	Climate Hazard	Risk Factor (Exposure)	Current Sensitivity and Adaptive Capacity of Development (Vulnerability)	Risk with Existing Adaptation Measures	Proposed Additional Adaptation/Mitigation Measures
			maintenance strategies, and material performance under climatic conditions.[47] Bins are stored in a secure Bin storage area, which will prevent the risk of causing harm in high winds[48].		
OTHER	**Compound events (acute)** *Increase in the number of compound flooding events*	Increased water runoff and pressure on drainage system	Drainage systems have been designed with ample capacity to store any excess storm water, with separate foul and surface water drainage systems to reduce the rate of run-off to the sewer and further reducing the risk of the sewer surcharging[49]. As detailed in the Engineering Assessment Report, the proposed surface water drainage system for this development has been designed as a SuDS system to treat run-off and remove pollutants to improve quality, restrict outflow and control quantity of run-off.	Low Risk once existing proposed measures are implemented.	No additional measures proposed. A programme of maintenance measures has been detailed in the Engineering Assessment Report. It will be the responsibility of the site management team to ensure the drainage system is maintained. Maintenance and cleaning of gullies, manholes (including catch pits) and all other SuDS features will ensure adequate performance.

[47] Building Lifecycle Report, MCORM, 2026.
[48] Refer to Operational Waste Management Plan, AWN,2026.
[49] Engineering Infrastructure Report & Stormwater Impact Assessment, Roger Mullarkey & Associates, April 2026

4.3 Mitigation and Adaptation Measures

4.3.1 Mitigation Measures

The Proposed Development shall seek to achieve the greatest standards of sustainable construction and design and has incorporated sustainable building design criteria from the outset which support overall climate change mitigation, including the requirement that the Development does not exceed the threshold set for the nearly zero-energy building (NZEB) requirements in national regulation implementing Directive 2010/31/EU.

A number of low energy technologies are being considered for the development, as described within the Energy Statement[50] and Building Lifecycle Report[51]:

Building Fabric and Passive Design

- **High-Performance Envelope**: Walls (0.18 W/m²K), roofs (0.16 W/m²K), floors (0.18 W/m²K), and windows (1.3 W/m²K) are designed to minimize heat loss
- **Air Tightness**: Target of 3 air changes per hour or better, reducing uncontrolled ventilation losses
- **Thermal Bridging**: Minimal bridging factor of 0.08, enhancing overall thermal performance
- **Passive Solar Design**: Optimized window placement for daylighting and solar gain, balanced against overheating risk

Energy Efficiency and NZEB Compliance

- **NZEB Standards**: All units comply with 2021 Part L Regulations, achieving an 'A' BER rating
- **DEAP Software v4.2**: Used to demonstrate compliance, showing a 70% reduction in energy use compared to 2005 standards
- **LED Lighting**: Full LED deployment with low energy demand and reduced internal heat gain

Renewable Energy Integration

- **Heat Pumps**: Air-to-water and exhaust air heat pumps proposed for space heating and hot water, leveraging grid decarbonization
- **Photovoltaic (PV) Panels**: Roof-mounted PV arrays to support Part L/NZEB compliance, reducing grid dependency
- **CHP (Combined Heat and Power)**: Considered for district heating, though not viable at current scale; would otherwise reduce grid load and utilize gas efficiently

[50] Refer to Climate Action Energy Statement, M&E Engineering, 2026
[51] Building Lifecycle Report, MCORM, 2026.

Ventilation and Indoor Air Quality

- **Heat Recovery Ventilation (HRV)**: Mechanical systems to recover heat from exhaust air while ensuring fresh air supply, improving energy efficiency and occupant health
- **Demand-Controlled Ventilation**: Systems with CO_2 sensors and heat recovery to optimize air quality and reduce energy use

Electric Vehicle (EV) Infrastructure

EV Charging Strategy:

- Ducting shall be provided from a local landlord distribution board to parking spaces

Sustainable Materials and Lifecycle Planning

- **Durable, Low-Maintenance Materials**: uPVC windows, concrete sills, and metal cladding selected for longevity and reduced embodied carbon
- **Lifecycle Costing**: Building Lifecycle Report the cost of maintenance and outlines the "Minimum Service life (Years)" of each material within Appendix A.

Waste Management

The principles of waste management and the circular economy have been incorporated into both the Construction Phase and Operational Phase to ensure that maximum recycling, reuse, and recovery of waste with diversion from landfill, wherever possible, is being achieved. [52]

4.3.2 Adaptation Measures

In relation to climate change adaption, overall, the climate risks for the Proposed Development are low based on the Site location and the incorporated design measures. Nevertheless, the following actions are recommended to ensure that these adaptive design measures, particularly in relation to drainage, are capable of operating as intended:

- Inspection and maintenance of HVAC systems is carried out periodically and completed in accordance with good practice.
- The correct operation and maintenance of the drainage system is necessary to reduce the risk of human or mechanical error causing pluvial flood risk from blockage. Inspection and maintenance of the drainage systems is carried out periodically and completed in accordance with good practice (particularly after every major storm event, the end of winter (to collect winter debris), mid-summer (to collect dust, flowers and grass-type deposits), and after autumn leaf fall). This will ensure that the drainage systems are capable of managing storm runoff during periods of exceptionally high rainfall. A programme of maintenance measures has been detailed in the Engineering Assessment Report. It will be the responsibility of the site management team to ensure

[52] Refer to Operational Waste Management Plan, AWN, 2026; and Resource & Waste Management Plan, AWN, 2026.

the drainage system is maintained. Maintenance and cleaning of gullies, manholes (including catch pits) and all other SuDS features will ensure adequate performance.

- It is expected that regular inspection and maintenance of drainage systems will be an effective measure to ensure that the Proposed Development is not at risk of flooding in the future. A regularly maintained drainage system will ensure that it remains effective and in good working order should a large pluvial storm occur. For storms greater than 100-year level, the development has been designed to provide an overland flood route. Additionally, the floor levels of the buildings are set above the 100-year flood levels. However, to account for a worst-case scenario, it is recommended to conduct a risk assessment, as necessary, when deciding the future location and placement of critical infrastructure.

- Risk relating to all changing climate hazards should be revisited and assessed periodically and in line with emerging studies to ensure that proper mitigation and adaptation measures are in place.

These recommended additional measures have been presented to Jackie Greene Construction Limited who have accepted them and committed to implementing them.

5 FINGAL DEVELOPMENT PLAN 2023-2029: RELEVANT POLICY OBJECTIVES AND ASSOCIATED SUSTAINABLE DEVELOPMENT GOALS

In accordance with FCC planning requirements, the preceding sections of this Report have assessed the impact of climate change on the Proposed Development.

The FDP 2023-2029 sets out a number of policy objectives which contribute towards mitigating and adapting to climate change. The format of the Plan aims to facilitate a holistic approach to ensuring Climate Action is at the forefront of all future development within the County, with a selection of policy objectives in multiple Chapters all contributing to aid in the transition of the County to a climate resilient low carbon society.

The following Table 6-1 demonstrates that the relevant policy objectives produced and implemented by FCC in relation to climate change and climate change protection measures, particularly in relation to drainage design, and sustainable development, as set out within the FDP have been incorporated into the Proposed Development design.

These initiatives not only address local environmental challenges but also advance broader sustainability targets set by the UN. Therefore, each relevant policy objective has also been carefully considered in the context of the UN Sustainable Development Goals (SDGs) as outlined within Table 1-3 of this Report, demonstrating that every mitigative or adaptive action to be included in the Proposed Development also aligns with and contributes to the relevant SDG.

Figure 5-1 Relevant Policies for Climate Change and Climate Change Protection Measures adapted from FCC Development Plan 2023-2029 and associated SDGs

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
SUSTAINABLE DEVELOPMENT			
Policy CAP2 – Mitigation and Adaptation	Prioritise measures to address climate change by way of both effective mitigation and adaptation responses in accordance with available guidance and best practice.	The Proposed Development shall seek to achieve the greatest standards of sustainable construction and design and has incorporated sustainable building design criteria from the outset which support overall climate change mitigation, including the requirement that the Development does not exceed the threshold set for the nearly zero-energy building (NZEB) requirements in national regulation implementing Directive 2010/31/EU.[53] This Report has considered potential impacts of climate change on the Proposed Development and has implemented and taken account of the Fingal County Council Climate Action Plan 2024-2029. The Proposed Development has undergone a thorough assessment with respect to climate change adaptation measures, and it has been determined that the measures in place are sufficient to address potential climate-related risks. The strategies incorporated into the design and planning of the development are aligned with current best practices and standards, ensuring resilience against projected climate impacts such as increased temperatures, flooding, and extreme weather events.	
Policy CAP5 – Climate Mitigation and Adaptation in the Built Environment	Ensure the built environment is equipped for the impacts of climate change by supporting climate change mitigation and adaptation measures as part of new and existing developments	The Proposed Development has undergone a thorough assessment with respect to climate change adaptation measures, and it has been determined that the measures in place are sufficient to address potential climate-related risks. The strategies incorporated into the design and planning of the development are aligned with current best practices and standards, ensuring resilience against projected climate impacts such as increased temperatures, flooding, and extreme weather events.	

[53] Refer to Climate Action Energy Statement, M&E Engineering, 2026

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
Policy CAP8 – Retrofitting and Reuse of Existing Buildings	Support the retrofitting and reuse of existing buildings rather than their demolition and reconstruction where possible	This is a greenfield site, therefore there are no existing onsite buildings suitable for retrofitting and reuse in the Proposed Development. However, the Proposed Development shall seek to achieve the greatest standards of sustainable construction and design and will have regard to sustainable building design criteria.	
Policy CAP9 – Energy Efficiency in Existing Buildings	Support high levels of energy conservation, energy efficiency and the use of renewable energy sources in existing buildings, including retro-fitting of appropriate energy efficiency measures in the existing building stock.	This is a greenfield site, therefore there are no existing onsite buildings suitable for retrofitting and reuse in the Proposed Development. However, the Proposed Development shall seek to achieve the greatest standards of sustainable construction and design and will have regard to sustainable building design criteria.	
Policy CAP10 – Climate Mitigation Actions in the Built Environment	Promote low carbon development within the County which will seek to reduce carbon dioxide emissions and which will meet the highest feasible environmental standards during construction and occupation. New development should generally demonstrate/provide for: a. Building layout and design which maximises daylight, natural ventilation, active transport and public transport use; b. Sustainable building/services/site design to maximise energy efficiency; c. Sensitive energy efficiency improvements to existing buildings; d. Energy efficiency, energy conservation, and the increased use of renewable energy in existing and new developments; e. On-site renewable energy infrastructure and renewable energy; f. Minimising the generation of site and construction waste and maximising reuse or	The Proposed Development at Swords Business Park is designed to reduce carbon emissions and achieve high environmental standards during both construction and occupation. The project incorporates a building layout and design that maximises daylight and natural ventilation, promoting energy efficiency. The use of advanced insulation, improved air tightness, and thermal bridging techniques further enhances energy conservation. The development includes state-of-the-art heating and cooling systems, such as variable refrigerant volume air conditioning with heat recovery and hot water heat pump cylinders, which are highly efficient. Solar photovoltaic panels are considered to generate renewable energy on-site, reducing reliance on non-renewable sources.[54] Additionally, the project focuses on minimising construction waste and maximising reuse and recycling[55]. The use of materials with low to zero embodied energy and CO_2 emissions will be chosen as much as possible, supporting a sustainable and low carbon future for the	 

[54] Refer to Climate Action Energy Statement, M&E Engineering, 2026

[55] Refer to Resource and Waste Management Plan, AWN, 2026; and Operational waste Management Plan, AWN, 2026.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
	recycling; and g. The use of construction materials that have low to zero embodied energy and CO2 emissions.	County. These measures collectively ensure that the development meets the highest feasible environmental standards.	
Policy CAP11 – Climate Adaptation Actions in the Built Environment	Development proposals should demonstrate sustainable design principles for new buildings/ services/site. The Council will promote and support development which is resilient to climate change. This would include: a. Measures such as green roofs and green walls to reduce internal overheating and the urban heat island effect; b. Ensuring the efficient use of natural resources (including water) and making the most of natural systems both within and around buildings; c. Minimising pollution by reducing surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems (SuDS); d. Reducing flood risk, damage to property from extreme events– residential, public and commercial; e. Reducing risks from temperature extremes and extreme weather events to critical infrastructure such as roads, communication networks, the water/drainage network, and energy supply; f. Promoting and protecting biodiversity and green infrastructure.	The Proposed Development has undergone a thorough assessment with respect to climate change adaptation measures, and it has been determined that the measures in place are sufficient to address potential climate-related risks. The strategies incorporated into the design and planning of the development are aligned with current best practices and standards, ensuring resilience against projected climate impacts such as increased temperatures, flooding, and extreme weather events. Refer to Table 4-1 for details on these adaptive measures.	
Policy CAP12 – Climate Action Energy Statements	All new developments involving 15 residential units and/or more than 1,000 sq. m. of commercial floor space, or as otherwise required by the Planning Authority, will be required to submit a Climate Action Energy Statement as part of the overall Design Statement to demonstrate how low carbon energy and heating solutions, have been	A Climate Action and Energy Statement has been prepared for the Proposed Development.[56]	

[56] Refer to Climate Action Energy Statement, M&E Engineering, 2026

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
	considered as part of the overall design and planning of the proposed development.		
Policy CAP13 – Energy from Renewable Sources	Actively support the production of energy from renewable sources and associated electricity grid infrastructure, such as from solar energy, hydro energy, wave/tidal energy, geothermal, wind energy, combined heat and power (CHP), heat energy distribution such as district heating/cooling systems, and any other renewable energy sources, subject to normal planning and environmental considerations.	The Proposed Development at Swords Business Park actively supports the production of energy from renewable sources and the associated electricity grid infrastructure. The project considers the installation of solar photovoltaic panels to harness solar energy, providing a sustainable and renewable source of electricity. Additionally, the development evaluates the feasibility of combined heat and power (CHP) systems, which enhance energy efficiency by utilising waste heat. While small-scale wind power was considered, it was deemed less suitable due to local constraints. The project also incorporates advanced heat pump systems for heating and cooling, further reducing reliance on non-renewable energy sources. These measures, combined with a focus on energy-efficient building design and construction, ensure that the development aligns with modern principles of renewable energy production and environmental sustainability.[57]	 
Policy CAP18 – Waste Heat, District Heating and Decentralised Energy	Actively encourage the development of low carbon and highly efficient district heating and decentralised energy systems across the County utilising low carbon heat sources such as renewable energy and waste heat recovery and to promote the connection of new developments to district heating networks where such systems exist/can be developed in a given area	The Proposed Development at Swords Business Park promotes low carbon and highly efficient district heating and decentralised energy systems. By using technologies like variable refrigerant volume air conditioning and hot water heat pumps, the project leverages renewable energy and waste heat recovery to reduce carbon emissions. Although the current infrastructure for district heating is not in place around the development, the design ensures compatibility with future district heating networks, supporting Fingal County Council's climate action goals.[58]	

[57] Refer to Climate Action Energy Statement, M&E Engineering, 2026
[58] Refer to Climate Action Energy Statement, M&E Engineering, 2026

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
			
Policy CAP19 – Supporting the Potential of District Heating in Fingal	Support the potential of district heating in Fingal, all Climate Action Energy Statements submitted to the Council (see Policy CAP12) shall include an assessment of the technical, environmental and economic feasibility of district or block heating or cooling, particularly where it is based entirely, or partially on energy from renewable and waste heat sources.	The Proposed Development at Swords Business Park supports the potential of district heating in Fingal. The Climate Action Energy Statement includes a detailed assessment of the technical, environmental, and economic feasibility of district heating systems, particularly those based on renewable energy and waste heat sources. While district heating offers advantages such as higher energy efficiencies and reduced energy consumption, the report notes that the infrastructure for district heating is not currently in place around the development area. Additionally, for district heating to be economically feasible, there needs to be a sufficient heat demand within a given area, which is not present in the vicinity of Swords Business Park. Therefore, although district heating is a promising option, its implementation is currently limited by the lack of existing infrastructure and sufficient heat demand. The proposed Development will utilise alternative systems which ensure energy efficiency and sustainability, aligning with Fingal County Council's climate action policies.[59]	 
Policy CAP26 – Waste Management Plans for Construction and Demolition Projects	Have regard to existing Best Practice Guidance on Waste Management Plans for Construction and Demolition Projects as well as any future updates to these Guidelines in order to ensure the consistent application of planning requirements.	The principles of waste management and the circular economy have been incorporated into both the Construction Phase and Operational Phase to ensure that maximum recycling, reuse, and recovery of waste with diversion from landfill, wherever possible, is being achieved. [60]	

[59] Refer to Climate Action, Energy Statement, M&E Engineering, 2026

[60] Refer to Operational Waste Management Plan, AWN, 2026; and Resource & Waste Management Plan, AWN, 2026.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
Policy CAP27 – Electric Vehicles	Ensure that sufficient charging points and rapid charging infrastructure are provided on existing streets where such infrastructure does not impede persons with mobility issues and in new developments subject to appropriate design, siting and built heritage considerations and having regard to the Planning and Development Regulations 2001 as amended, which have been updated to include EV vehicle charging point installation, so that EV Street Charging Points be provided to every community of the County.	The proposed development will provide ducting shall to external parking spaces. This will enable the company to install several E-car charging points to cater for E-car demand of the residents.	
Policy CAP28 – Flood and Water Resource Resilience	Support the delivery of soft, green and grey adaptation measures to enhance flood and water resource resilience where appropriate in the County.	SuDs measures have been incorporated into the drainage design to reduce run-off intensity and improve run-off water quality. The typical traditional and SuDS to be provided are as follows: • Permeable paving; • Underground Attenuation Storage Structure • Integrated Constructed Wetland • Tree pits; • Rainwater harvesting; • Oversized pipes. . The incorporation of the above SuDS elements will provide a sustainable manner in which to disperse surface water from the site, encourage groundwater recharge and provide treatment of run-off and subsequent improvement of discharge quality. Refer to the Engineering Planning Report for more detail on the drainage design and each of the above-listed SuDS measures[61].	

[61] Engineering Infrastructure Report & Stormwater Impact Assessment, Roger Mullarkey & Associates, April 2026.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
Policy CAP29 – Flood Risk Assessment and Adaptation	Address flood risk at strategic level through the process of Strategic Flood Risk Assessment, and through improvements to the County's flood defences.	An SSFRA[62] has been prepared for the Proposed Development which has assessed the susceptibility of the Site to tidal, fluvial, pluvial, and groundwater flooding. In order to conduct the assessment, the following sources of information have been consulted: • OPW's National Flood Information Portal (www.floodinfo.ie); • Guidelines for Planning Authorities on *"The Planning System and Flood Risk Management"*, November 2009 (OPW and Department of Environment, Heritage and Local Government); • GDSDS (www.greaterdublindrainage.com); • Fingal Development Plan 2023 – 2029 SFRA; • CFRAM (Catchment Flood Risk Assessment and Management). Through site location, careful design, and appropriate mitigation measures, the risks and consequences of flooding have been mitigated across the development.	 
Policy CAP30 – Natural Flood Risk Mitigation	Encourage the use natural flood risk mitigation or nature-based solutions including integrated wetlands, green infrastructure, and Sustainable Drainage Systems (SuDS) as part of wider adaptation and mitigation responses to achieve flood resilience.	SuDs measures have been incorporated into the drainage design to reduce run-off intensity and improve run-off water quality. The typical traditional and SuDS to be provided are as follows: • Permeable paving; • Underground Attenuation Storage Structure • Integrated Constructed Wetland • Tree pits; • Rainwater harvesting; • Oversized pipes. . The incorporation of the above SuDS elements will provide a sustainable manner in which to disperse surface water from the site,	

[62] Site Specific Flood Risk Assessment, Roger Mullarkey & Associates, April 2026.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
		encourage groundwater recharge and provide treatment of run-off and subsequent improvement of discharge quality. Refer to the Engineering Assessment Report for more detail on the drainage design and each of the above-listed SuDS measures[63].	
Policy CAP35 – Climate Action and Green Infrastructure	Protect, connect and expand the County's green infrastructure while optimising the climate change adaptation and mitigation services it provides.	According to the Landscape Design Statement[64], the Proposed Development takes account of the FDP green infrastructure strategy and addresses the five main green infrastructure themes: 1. Landscape 2. Water 3. Biodiversity 4. Open Space 5. Heritage The Proposed Development will incorporate and promote these themes in order to improve the existing ecosystems and their intrinsic connections. The Proposed Development seeks to establish a comprehensive green infrastructure network through the delivery of a connected series of open spaces, ecological corridors, and nature-based amenity areas. The landscape design responds to the site's existing characteristics, including retained tree belts and hedgerows, and enhances biodiversity through the integration of native planting, ecological corridors along site boundaries, and habitat features such as bird and bat boxes. The scheme incorporates a structured hierarchy of open spaces, including perimeter green corridors, communal courtyard spaces, and rooftop gardens, providing both active and passive recreational opportunities for residents. A continuous perimeter walking route is proposed, linking to the wider green infrastructure network and facilitating access to nature.	 

[63] Engineering Infrastructure Report & Stormwater Impact Assessment, Roger Mullarkey & Associates, April 2026.
[64] Refer to Landscape Design Statement, CSR, 2026

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
		Green infrastructure is further supported through the integration of SuDS features, including bioretention areas and surface water management measures within landscaped areas, alongside tree planting and green roofs to maximise urban greening. The landscape strategy adopts a nature-based approach, combining ecological planting at site edges with more formal amenity planting within central areas to create a cohesive and legible environment. In accordance with the FDP, the Proposed Development promotes high-quality design, visual continuity, and pedestrian and cycle permeability through a network of accessible routes, strong internal linkages, and integration with the surrounding context. Key elements include: • Provision of ecological corridors and retention of existing vegetation where feasible; • Creation of an accessible pedestrian and cycling network; • Integration of SuDS measures within landscaped spaces; • Delivery of linked communal and public open spaces; • Enhancement of biodiversity through native planting and habitat creation. The above design elements compliment Section 14.15.1 of the FDP: Business Parks and Industrial Areas aims to “achieve high quality design, visual continuity and pedestrian/cycle friendly environments whilst ensuring the functioning of business and industrial locations” Further details are provided within the Landscape Design Statement and associated Landscape Masterplans.	

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

To conclude, this Report has demonstrated the potential impacts of climate change on the Proposed Residential Development at Swords Business Park, Greenfield, Co. Dublin through the preparation of a Climate Risk and Vulnerability Assessment, which has incorporated the following:

- Climate projections (EPA and IPCC) across a conservative range of future scenarios have been examined, along with the Proposed Development location, to gain an understanding of the future risks that climate change may have on the Proposed Development;

- Screening of potential climate hazards relevant to the location of the Proposed Development and the projected changes in future climate for this location to determine what hazards pose a material risk;

- Assessment of identified material risks, taking account of relevant adaptation and mitigation measures which have been incorporated into the Development design, in accordance with the IPCC's Climate Risk Framework;

- Provision of recommended additional actions to further reduce the potential risks of identified climate hazards.

This Report has dually met the requirements of FCC for a Climate Change Impact Assessment which has assessed the impact of climate change on the Proposed Development and ensures that the policies and objectives produced and implemented by the local authority in relation to climate change and climate change protection measures, particularly in relation to drainage design, as set out within the FDP, have been incorporated into the Proposed Development design. Each relevant policy and objective has also been carefully considered in the context of the UN SDGs, and the Report has demonstrated that every mitigative or adaptive action to be included in the Proposed Development also aligns with and contributes to the associated SDG.

Furthermore, this Report has provided information to support the relevant public body in carrying out its functions in a manner which is consistent with national climate plans and strategies and furthering the achievement of the national climate objective as set out under Section 15 of the Climate Action and Low Carbon Development Act 2015, as amended in 2021. The current CCIA report should be reviewed alongside the relevant and current Local Authority Climate Action plan to ensure alignment with relevant objectives and targets.

6.2 Recommendations

6.2.1 Climate Risk and Vulnerability

In relation to climate change adaption, overall, the climate risks for the Proposed Development are low based on the Site location and the incorporated design measures. Nevertheless, the following actions are recommended to ensure that these adaptive design measures, particularly in relation to drainage, are capable of operating as intended:

- Inspection and maintenance of HVAC systems is carried out periodically and completed in accordance with good practice.

- The correct operation and maintenance of the drainage system is necessary to reduce the risk of human or mechanical error causing pluvial flood risk from blockage. Inspection and maintenance of the drainage systems is carried out periodically and completed in accordance with good practice (particularly after every major storm event, the end of winter (to collect winter debris), mid-summer (to collect dust, flowers and grass-type deposits), and after autumn leaf fall). This will ensure that the drainage systems are capable of managing storm runoff during periods of exceptionally high rainfall. A programme of maintenance measures has been detailed in the Engineering Assessment Report. It will be the responsibility of the site management team to ensure the drainage system is maintained. Maintenance and cleaning of gullies, manholes (including catch pits) and all other SuDS features will ensure adequate performance.

- It is expected that regular inspection and maintenance of drainage systems will be an effective measure to ensure that the Proposed Development is not at risk of flooding in the future. A regularly maintained drainage system will ensure that it remains effective and in good working order should a large pluvial storm occur. For storms greater than 100-year level, the development has been designed to provide an overland flood route. Additionally, the floor levels of the buildings are set above the 100-year flood levels. However, to account for a worst-case scenario, it is recommended to conduct a risk assessment, as necessary, when deciding the future location and placement of critical infrastructure.

- Risk relating to all changing climate hazards should be revisited and assessed periodically and in line with emerging studies to ensure that proper mitigation and adaptation measures are in place.

These recommended additional measures have been presented to Jackie Greene Construction Limited who have accepted them and committed to implementing them.

7 REFERENCES

'Technical Annex B: Climate Change Risk Assessment' of the 'Local Authorities Climate Action Planning Guidelines'.

Climate Central - Coastal Risk Screening Tool

Climate Ireland - Climate Change Projection Maps

Commission Delegated Regulation (EU) of 4.6.2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council.

Corporate Sustainability Due Diligence Directive (CSDDD).

Corporate Sustainability Reporting Directive (CSRD).

The European Financial Reporting Advisory Group (EFRAG): The first set of ESRS - the journey from PTF to delegated act (adopted on 31 July 2023) - EFRAG

Department of Housing, Local Government and Heritage, (2021) 'Building Regulations Technical Guidance Document L 2021- Conservation of Fuel and Energy – Dwellings,'

Fingal Development Plan 2023-2029.

Fingal County Council Climate Action Plan 2024-2029.

Environmental Protection Agency, (2022), Online Mapping, Available at: https://gis.epa.ie/EPAMaps/

EPA Radon Map for Ireland

Geological Survey Ireland - Landslide Susceptibility Map

I.S. EN ISO 14091:2021 Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment.

Intergovernmental Panel on Climate Change (2021) Working Group I (WGI): Sixth Assessment Report - online Interactive Atlas. Available at: https://interactive-atlas.ipcc.ch/

Intergovernmental Panel on Climate Change (2021) Working Group I contribution to the Sixth Assessment Report, Climate Change 2021: The Physical Science Basis.

Intergovernmental Panel on Climate Change (2022) Sixth Assessment Report.

Intergovernmental Panel on Climate Change (2022) Working Group II Contribution to the Sixth Assessment Report (AR6), Climate Change 2022: Impacts, Adaptation and Vulnerability.

Ireland's 4th National Biodiversity Action Plan.

Ireland's National Adaptation Framework.

Iturbide, M., Fernández, J., Gutiérrez, J.M., Bedia, J., Cimadevilla, E., Díez-Sierra, J., Manzanas, R., Casanueva, A., Baño-Medina, J., Milovac, J., Herrera, S., Cofiño, A.S., San Martín, D., García-Díez, M., Hauser, M., Huard, D., Yelekci, Ö. (2021) Repository supporting the implementation of FAIR principles in the IPCC-WG1 Atlas. Zenodo, DOI: 10.5281/zenodo.3691645. Available from: https://github.com/IPCC-WG1/Atlas

Met Eireann: https://www.met.ie/tornadoes-an-irish-perspective

P. Nolan and J. Flanagan (2020) High-Resolution Climate Projections for Ireland – a Multi-model Ensemble Approach. EPA Research Report No. 339.

Regulation (EU) 2020/852 of the European Parliament and of the Council (the 'Taxonomy Regulation').

Sustainable Development Goals National Implementation Plan 2022-2024.

The 2021 Climate Action Plan.

The Climate Action and Low Carbon Development Act 2015.

www.Gov.ie, 'CFRAM Programme' – Policy Information, 2021.

Building Lifecycle Report, MCORM, 2026

Climate Action, Energy & Sustainability Statement, M&E Ltd, 2026

Engineering Assessment Report, Roger Mullarkey, 2026.

Operational Waste Management Plan, AWN, 2026.

Resource & Waste Management Plan, AWN, 2026.

Flood Risk Assessment, Roger Mullarkey, 2026.

Landscape Design Statement, CSR, 2026

Head Office

3D, Core C, Block 71, The Plaza, Park West, Dublin 12, D12F9TN, Ireland.
Tel: +353 1 565 4730
Email: bes.info@dnv.com

South West Regional Office

19 Henry Street, Kenmare, County Kerry, V93 CVH0, Ireland.
Tel: +353 646 641932
Email: bes.info@dnv.com

South East Regional Office

M10 Wexford Enterprise Centre, Strandfield Business Park, Rosslare Rd, Strandfield,. Wexford, Y35 W5RD, Ireland.
Tel: +353 1 565 4730
Email: bes.info@dnv.com

Appendix 1

Appendix A (Classification of climate-related hazards) from Annex II of the Commission Delegated Regulation (EU) 2021/2139.

APPENDIX A: CLASSIFICATION OF CLIMATE-RELATED HAZARDS[669]

	Temperature-related	Wind-related	Water-related	Solid mass-related
Chronic	Changing temperature (air, freshwater, marine water)	Changing wind patterns	Changing precipitation patterns and types (rain, hail, snow/ice)	Coastal erosion
	Heat stress		Precipitation or hydrological variability	Soil degradation
	Temperature variability		Ocean acidification	Soil erosion
	Permafrost thawing		Saline intrusion	Solifluction
			Sea level rise	
			Water stress	
Acute	Heat wave	Cyclone, hurricane, typhoon	Drought	Avalanche
	Cold wave/frost	Storm (including blizzards, dust and sandstorms)	Heavy precipitation (rain, hail, snow/ice)	Landslide
	Wildfire	Tornado	Flood (coastal, fluvial, pluvial, ground water)	Subsidence
			Glacial lake outburst	

[669] The list of climate-related hazards in this table is non-exhaustive, and constitutes only an indicative list of most widespread hazards that are to be taken into account as a minimum in the climate risk and vulnerability assessment.