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Climate Change Impact Assessment Report

PRESENTED TO

Zolbury Ltd

Blackglen Road, Sandyford, Dublin 18

Environmental Consultancy Services

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1 INTRODUCTION AND METHODOLOGY

Enviroguide has been commissioned to produce a Climate Change Impact Assessment Report (CCIA) on behalf of Zolbury Ltd for a proposed Large Scale Residential Development at Blackglen Road, Sandyford, Dublin 18 (hereafter referred to as the Proposed Development). A full project description is in included in Section 1.1 of this report.

The contents of this Report provide dual duty to the requirements as set out in Regulation (EU) 2020/852 of the European Parliament and of the Council (the 'Taxonomy Regulation') for a Climate Risk and Vulnerability Assessment and Dún Laoghaire-Rathdown County Council (DLRCC) requirements for a Climate Change Impact Assessment as set out in the Development Management Thresholds Information Document. It has been undertaken in accordance with 'Technical Annex B: Climate Change Risk Assessment' of the 'Local Authorities Climate Action Planning Guidelines' and provides a qualitative 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.

This report can be utilised by the organisation to prepare for meeting EU sustainability reporting requirements under the Corporate Sustainability Reporting Directive (CSRD) and proposed Corporate Sustainability Due Diligence Directive (CSDD). Specifically, Standard ESRS E1-Climate change within the CSRD and environmental due diligence within the incoming CSDDD. Companies that fall under the scope of the Corporate Sustainability Reporting Directive (CSRD) also have to report in their annual reports to what extent their activities are covered by the EU Taxonomy (Taxonomy-eligibility) and comply with the criteria set in the Taxonomy delegated acts (Taxonomy-alignment).

Additionally, 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 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.

In accordance with the Taxonomy Regulation, the purpose of this Report is to determine IF the Proposed Development qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining that the Proposed Development causes no significant harm to any of the other environmental objectives as set out within the Regulations.

In accordance with DLRCC 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 Dún Laoghaire Rathdown County Development Plan 2022-2028 (DLR CDP), have been incorporated into the Proposed Development design. The relevant policy objectives of the DLR CDP have also been

carefully considered in the context of associated UN Sustainable Development Goals (SDGs), and their incorporation into the Proposed Development design.

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 exercise. 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.

1.1 Project Description

Zolbury Ltd., intend to apply to Dun Laoghaire Rathdown County Council for permission for development for a Large Scale Residential Development (LRD) on a site of approx. 3.86ha on lands at Blackglen Road, Sandyford, Dublin 18.

The development will consist of 192 no. residential units ranging from 2-5 storeys in height, associated resident amenity facilities, a childcare facility, all boundary treatment and landscaping works, site services connections and all site development works to include:

a) Construction of 192 no. residential units, in the form of 6 no. new apartment buildings (A1 – B4), 40 duplexes (C1, C2, C2A) and 14 houses (D1 & D2), to include 33 no. 1-beds, 84 no. 2 -beds, 61 no. 3-beds and 14 no. 4-beds as follows:

   - Block A1 (4 storeys) comprising 15 no. apartments (3 no. 1 bed units, 6 no. 2 bed units & 6 no. 3 bed units); a crèche facility of approx. 378.2 sq. m with associated outdoor play space of approx. 170 sq. m; and resident amenity facilities of approx. 31.6 sq. m.

   - Block A2 (3-4 storeys) comprising 26 no. apartments (2 no. 1 bed units, 20 no. 2 bed units and 4 no. no. 3 bed units) and resident amenity facilities of approx. 353.6 sq. m.

   - Blocks B1 and B2 (2-5 storeys) comprising 51 no. apartments (15 no. 1 bed units, 29 no. 2 bed units, 7 no. 3 bed units).

   - Blocks B3 and B4 (2-5 storeys) comprising 46 no. apartments (13 no. 1 bed units, 23 no. 2 bed units and 10 no. 3 bed units).

   - Duplex Units C1 (4 storeys), C2 and C2A (3 storeys) comprising 40 duplexes (6 no. 2 bed units, 20 no. 3 bed units and 14 no. 4 bed units).

   - House Units D1 and D2 (2 storeys) comprising 14 houses (14 no. 3 bed units).

b) Total Open space (approx. 10,854 sq. m) is proposed in the form of public open space (approx. 8, 686 sq. m), and residential communal open space (approx. 2,168 sq. m). Each residential unit is afforded with associated private open space in the form of a garden/terrace/balcony.

c) The development will be served via a new vehicular access via Blackglen Road. This will be designed as a priority junction with pedestrian and cycle crossings where required to tie in with the Blackglen Road Improvement Scheme.

d) A new toucan crossing is proposed across Blackglen Road just to the east of the new vehicular access. This toucan crossing has been designed as per TL607 of the Cycle Design Manual to allow crossing of pedestrians and cyclists to the northern side of Blackglen Road for improved public transport access.

e) Emergency access only is proposed via Woodside Road.

f) A dedicated wildlife corridor is proposed to the east/south-east side of the site and a public open space (approx. 307 m in length) tree trail to the west/north-west side of the site.

g) Basement/Podium car park areas are proposed below Blocks B1, B2, B3 and B4. A total of 226 no. car parking spaces are proposed, which includes 2 no. car club spaces, 12 no. accessible spaces and 47 no. EV charging spaces (198 no. long-stay spaces, 18 no. visitor space & 10 no. car parking spaces for creche use), in addition to 9 no. motorcycle spaces.

h) A total of 484 no. bicycle spaces are proposed in the form of 442 no. long stay bicycle spaces 42 short-term stay visitor parking.

i) 2 no. ESB substations at surface level.

j) Bin Storage areas for the Duplex blocks are proposed at ground level adjacent to the Duplex blocks.

k) All associated site and infrastructural works to include provision for water services; foul and surface water drainage and connections; internal roads, attenuation proposal; permeable paving; all landscaping works including green infrastructure zones; green roofs; and general plant areas; photovoltaic panels; landscaped boundary treatment; footpaths; public lighting; and electrical services.

1.2 Legislative and Strategic Context

1.2.1 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.

The purpose of this Regulation is to encourage transparency and consistency in the classification of environmentally sustainable economic activities.

The Taxonomy Regulation requires that organisations meet the following conditions in order to be considered a sustainable economic activity:

- Make a substantive contribution to one of six environmental objectives:
    - Climate Change Mitigation
    - Climate Change Adaptation
    - The Sustainable Use and Protection of Water and Marine Resources
    - The Transition to a Circular Economy
    - Pollution Prevention and Control
    - The Protection and Restoration of Biodiversity and Ecosystems
- Do no significant harm to the other five, where relevant;
- Meet minimum safeguards (as set out by the relevant legislation).
- Comply with relevant technical screening criteria[1].

Commission Delegated Regulation (EU) 2021/2139 [2] (the 'Supplementing Regulation') supplements regulation 2020/852 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.

1.2.1.1 Technical Screening Criteria Requirements

The Supplementing Regulation establishes the Technical Screening Criteria specific to certain economic activities. The Proposed Development consists of the construction of a large-scale residential development. Therefore, in accordance with Annex II, Section 7.1, of the Supplementing Regulation, activities must comply with relevant technical screening criteria for the "Construction of new buildings". Annex II Section 7.1 sets out the relevant technical screening criteria to the project; these are grouped into two categories:

1. Substantial Contribution to Climate Change Adaptation; and
2. Do no significant harm ('DNSH').

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

Section 5 of this Report details the specific environmental objectives and technical screening criteria for the "*Do no significant harm ('DNSH')"* category and demonstrates how the Proposed

[1] Specific requirements that must be satisfied to achieve Environmentally Sustainable status under the EU Taxonomy as set out in the Supplementing Regulation (EU) 2020/852.

[2] 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.

Development meets these criteria.

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.
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;	See Section 4 of this report for Climate Risk and Vulnerability Assessment.

[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
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 5 of this report for Do No Significant Harm. See Section 6 of this report for Dún Laoghaire-Rathdown County Development Plan 2022-2028: Relevant Policies and Objectives

1.2.2 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 Groups and a Synthesis Report, three Special Reports, and a refinement to its latest Methodology Report; these are as follows:

- **Working Group (WG) I** 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 – this report is currently in review and will be finalised in late 2022 or early 2023.

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.

1.2.3 Dún Laoghaire-Rathdown County Council Planning Requirements

The Development Management Thresholds Information Document prepared by Dún Laoghaire Rathdown County Council (DLRCC) acts as a guideline to assist applicants in relation to the documents they may be required to submit as part of their planning application. By assessing the 'Key Thresholds' table and the main Thresholds List, applicants will be informed as to what they may be required to submit as part of their planning application. In relation to the assessment of climate change, the following threshold applies to the Proposed Development:

Table 1-2: Extract from "Key Thresholds Table" contained within the DLRCC Development Management Thresholds Information Document

Policy/Heading	Submit	Threshold	Commentary
New Developments – Environmental Impacts	Climate Change Impact Assessment	50 residential units or more' and 'all other developments measuring 1,000 sq.m GFA and above	An assessment of the impacts of climate change on the development and provisions for these impacts in particular relating to drainage design.

The Proposed Development has met the threshold as specified within Table 1-2 above, therefore an associated Climate Change Impact Assessment (CCIA) is required. The Climate Change Impact Assessment (CCIA) Report will assess the impact of climate change on the Proposed Development and ensure 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 Dún Laoghaire Rathdown County Development Plan 2022-2028 (DLR CDP), have been incorporated into the Proposed Development design.

1.2.3.1 Dún Laoghaire-Rathdown County Council Climate Action Plan 2024-2029

In February 2024, DLRCC adopted the Dún Laoghaire Rathdown Climate Action Plan 2024-2029 (DLR 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 DLRCC's energy efficiency by 2030
2. 51% reduction in DLRCC'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 DLRCC 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, DLRCC has reviewed the risks posed by climate change for the County and the implications of these risks for the delivery of services by DLRCC. 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 DLR CAP has been considered in Section 3 of this report.

1.2.3.2 Dún Laoghaire-Rathdown County Development Plan (CDP) 2022-2028

The new DLR CDP sets out the policy objectives and the overall strategy for the proper planning and sustainable development of the County over the plan period from 2022 to 2028.

The Climate Action chapter of the plan (Chapter 3) 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 four key issues, namely:

- Energy Efficiency in Buildings;
- Renewable Energy;
- Decarbonising Motorised Transport;
- Urban Greening.

These issues have been identified as being of particular significance in helping to achieve sustainable planning outcomes which will ultimately help to deliver a low carbon and a climate resilient County. Planning already plays a role in each of the key areas identified in the DLR CAP. Having regard to the headings set out in the DLR CAP, the Development Plan contains a range of policy objectives which aim to mitigate and adapt to climate change.

The creation of a climate resilient County is an overarching strategic outcome of the DLR CDP, 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.

1.2.4 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.

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 Report has been prepared in accordance with the DLR Climate Action Plan 2024-2029 (and associated climate adaptation and mitigation strategy) and the policy objectives of the

[5] Dún Laoghaire-Rathdown County Development Plan 2022-2028.

DLR Development Plan 2022-2028 relating to climate action and environmental infrastructure and flood risk. These documents have been developed on foot of national climate action strategies, plans, and objectives and provide a regional approach to climate action, which is the overarching recommendation of national strategies and plans. Therefore, this Report provides information to support the relevant public body in carrying out its functions under Section 15 of the Climate Action and Low Carbon Development Act 2015, as amended in 2021.

1.2.5 National Adaptation Framework

Ireland's first statutory National Adaptation Framework (NAF) was published on 19 January 2018 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.

1.2.6 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 by 2030. 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. Identified actions align closely with the objectives of the following SDGs:

Table 1-3: 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

In Section 6 of this Report, the relevant policy objectives of the DLR CDP have been carefully considered in the context of the above-listed SDGs, and their incorporation into the Proposed Development design.

1.2.7 Mandatory Sustainability Reporting Considerations

1.2.7.1 Corporate Sustainability Reporting Directive (CSRD)

On 5 January 2023, the Corporate Sustainability Reporting Directive (CSRD) entered into force. It modernises and strengthens the rules concerning the social and environmental information that companies must report. The CSRD is effective from 01 January 2024 for those entities already subject to the NFRD (reporting in 2025) and from 01 January 2025 for all other large companies (reporting in 2026).

Companies subject to the CSRD will have to report according to European Sustainability Reporting Standards (ESRS). The standards are developed in a draft form by the EFRAG, previously known as the European Financial Reporting Advisory Group.

If the client falls in scope for CSRD, the results from this current Climate Change Impact Assessment Report should be reviewed in line with the materiality assessment and annual CSRD disclosure requirements. Specifically, the report and findings may serve as an evidence base for EFRAG Standard ESRS E1 CLIMATE CHANGE.

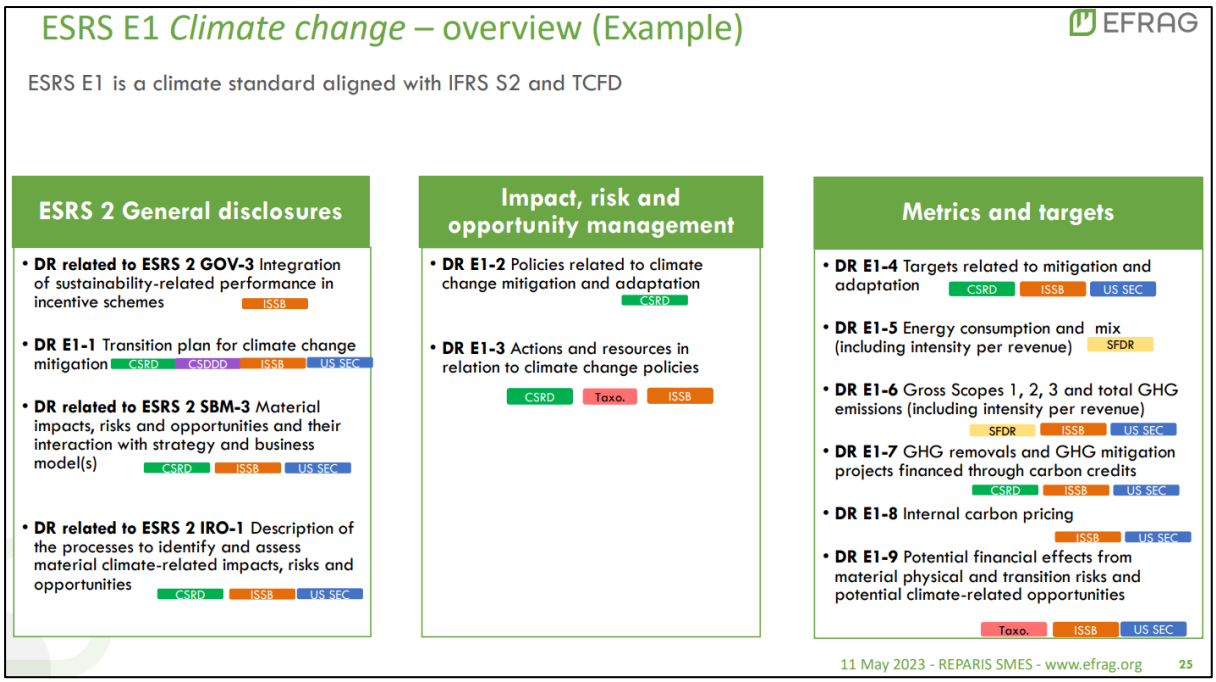


Figure 1-2: ESRS E1 Climate Change: presented by Eric Duvaud, EFRAG SR TEG member (Source: [The first set of ESRS – the journey from PTF to delegated act (adopted on 31 July 2023) – EFRAG])

The data/information from this CCIA should be considered for Impact, Risk and Opportunity Management Disclosure Requirements 20 and 21 below within ESRS E1 CLIMATE CHANGE:

20. The undertaking shall describe the process to identify and assess climate-related impacts, risks and opportunities. This description shall include its process in relation to:

(a) impacts on climate change, in particular, the undertaking's GHG emissions (as required by Disclosure Requirement ESRS E1-6);

(b) climate-related physical risks in own operations and along the upstream and downstream value chain, in particular:

i. the identification of climate-related hazards, considering at least high emission climate scenarios; and

ii. the assessment of how its assets and business activities may be exposed and are sensitive to these climate-related hazards, creating gross physical risks for the undertaking.

(c) climate-related transition risks and opportunities in own operations and along the upstream and downstream value chain, in particular:

i. the identification of climate-related transition events, considering at least a climate scenario in line with limiting global warming to 1.5°C with no or limited overshoot; and

ii. the assessment of how its assets and business activities may be exposed to these climate-related transition events, creating gross transition risks or opportunities for the undertaking.

21. When disclosing the information required under paragraphs 20 (b) and 20 (c) the undertaking shall explain how it has used climate-related scenario analysis, including a range of climate scenarios, to inform the identification and assessment of physical risks and transition risks and opportunities over the short-, medium- and long-term.

Table 1-4 of this Report details the Impact, Risk and Opportunity Management Disclosure Requirements 20 and 21 within ESRS E1 CLIMATE CHANGE, and the associated sections of this Report in which these requirements have been addressed.

1.2.7.2 Corporate Sustainability Due Diligence Directive (CSDDD)

This proposed Directive establishes a corporate due diligence duty. The core elements of this duty are identifying, bringing to an end, preventing, mitigating and accounting for negative human rights and environmental impacts in the company's own operations, their subsidiaries and their value chains. In addition, certain large companies must have a plan to ensure that their business strategy is compatible with limiting global warming to 1.5 °C in line with the Paris Agreement.

The CSDDD is expected to complement the CSRD as it will require companies to implement comprehensive identification, prevention and mitigation processes to eliminate adverse human rights and environmental impacts in the company's own operations, its subsidiaries and value chains. It will also complement the Taxonomy Regulation that requires specific details of what constitute "environmentally sustainable" investments.

It is expected that the CSDDD will require companies in scope to ensure the identification, prevention, mitigation and ability to account for any adverse environmental impacts, with adequate governance, management systems and measures in place to this end.

For instance, regarding adverse climate change impacts, a company would have to obtain quantitative and qualitative information about baseline conditions at higher risk sites or facilities. Identification of adverse impacts would include assessing the environmental context in a dynamic way and at regular intervals, prior to a new activity or relationship; prior to major decisions or changes in the operation; in response to or anticipation of changes in the operating environment; and periodically (at least every 12 months) throughout the life of an activity or relationship. The following Climate Change Impact Assessment can serve as due diligence demonstrating compliance with the CSDDD.

1.2.8 Just Transition

The 2021 Climate Action Plan sets out a just transition framework consisting of four principles to underpin both processes and implementation of all climate action policies and measures. The present report primarily examines the impact of climate change. However, we recommend that due consideration be given to the concept of a "just transition," aligning with the Irish Government's framework, to ensure a comprehensive approach to addressing the climate crisis that extends beyond mere climate action.

The just transition framework is made up of four principles:

1. An integrated, structured, and evidence-based approach to identify and plan our response to just transition requirements.
2. People are equipped with the right skills to be able to participate in and benefit from the future net zero economy.

3. The costs are shared so that the impact is equitable and existing inequalities are not exacerbated.
4. Social dialogue to ensure impacted citizens and communities are empowered and are core to the transition process.

1.2.9 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, 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.

1.2.10 Home Performance Index

Home Performance Index (HPI) Certification is Ireland's national certification for new homes. Similar to certification for commercial development. The Home Performance Index aligns with national climate, planning and regulatory policy. It is also aligning with European climate policy in particular EU Taxonomy and EU Level(s) Framework, and global agreements such as the Paris Climate Agreement, and UN Sustainable Development Goals. Within the HPI requirements climate risk must be calculated and align with EU taxonomy on two levels, namely:

- Level 1 Align with EU Taxonomy Climate Change adaptation – Do No Significant Harm" The Activity complies with the Criteria set out in Appendix A to EU Taxonomy Annex 1" (EU Taxonomy Annex 1)
- Level 2 Align with EU Taxonomy Climate Change adaptation – Substantial Contribution

The following CCIA report can be used to evidence both above requirements within the HPI assessment methodology for the proposed residential development. It meets the climate risk and vulnerability assessment criteria, is proportionate to the scale of the activity and its expected lifespan. The climate projections and assessment of impacts for the proposed development are based on best practice and available guidance and consider 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/ paying models.

Table 1-4: ESRS E1 Climate Change Requirements

ESRS E1 Climate Change Requirements[6]		Relevant Section of this Report
20. The undertaking shall describe the process to identify and assess climate-related impacts, risks and opportunities. This description shall include its process in relation to:	(a) impacts on climate change, in particular, the undertaking's GHG emissions (as required by Disclosure Requirement ESRS E1-6);	A number of strategies have been outlined in Section 4.3 of this report which will be adopted within the development to maximise low energy use, promote circular waste management, and reduce carbon emissions. Quantification of the Proposed Development's GHG emissions is outside the scope of this assessment.
	(b) climate-related physical risks in own operations and along the upstream and downstream value chain, in particular: (i) the identification of climate-related hazards, considering at least high emission climate scenarios; and (ii) the assessment of how its assets and business activities may be exposed and are sensitive to these climate-related hazards, creating gross physical risks for the undertaking.	See Section 3 of this Report for a Climate Risk Screening which identifies material climate-related hazards based on both intermediate and high-emission scenarios. See Section 4 of this Report for a Climate Risk and Vulnerability Assessment which evaluates these climate-related hazards, the risk factors (Exposure), the current sensitivity and adaptive capacity of the development (Vulnerability), and the subsequent risk level.
	(c) climate-related transition risks and opportunities in own operations and along the upstream and downstream value chain, in particular: (i) the identification of climate-related transition events, considering at least a climate scenario in line with limiting global warming to 1.5°C with no or limited overshoot; and	The Dún Laoghaire-Rathdown County Development Plan 2022-2028 includes a robust framework of policies and objectives aimed at driving climate-related transitions. These measures are designed to promote sustainability, reduce emissions, enhance

[6] as set out in the Draft European Sustainability Reporting Standards (ESRS) by the EFRAG (previously known as the European Financial Reporting Advisory Group).

ESRS E1 Climate Change Requirements[6]		Relevant Section of this Report
	(ii) the assessment of how its assets and business activities may be exposed to these climate-related transition events, creating gross transition risks or opportunities for the undertaking.	resilience, and ensure that the county contributes effectively to national and international climate goals. See Section 6 of this report for Dún Laoghaire-Rathdown County Development Plan 2022-2028: Relevant Policies and Objectives and how these have been considered in the current proposal.
21. When disclosing the information required under paragraphs 20 (b) and 20 (c) the undertaking shall explain how it has used climate-related scenario analysis, including a range of climate scenarios, to inform the identification and assessment of physical risks and transition risks and opportunities over the short-, medium- and long-term.		See Section 2 of this Report for Climate Change Projections which includes a climate-related scenario analysis.

2 CLIMATE CHANGE PROJECTIONS

2.1 Technical Screening Criteria Requirements

The Supplementing Regulation establishes the Technical Screening Criteria specific to certain economic activities. In accordance with Annex II, Section 7.1, of the Supplementing Regulation, activities must comply with relevant technical screening criteria for the "Construction of new buildings" Substantial Contribution to Climate Change Adaptation which 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[7] in combination with EPA Research Report No. 339[8]. 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.

[7] Climate Ireland - Climate Change Projection Maps.

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

As per the Taxonomy Regulation, 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).

2.2 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.

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:

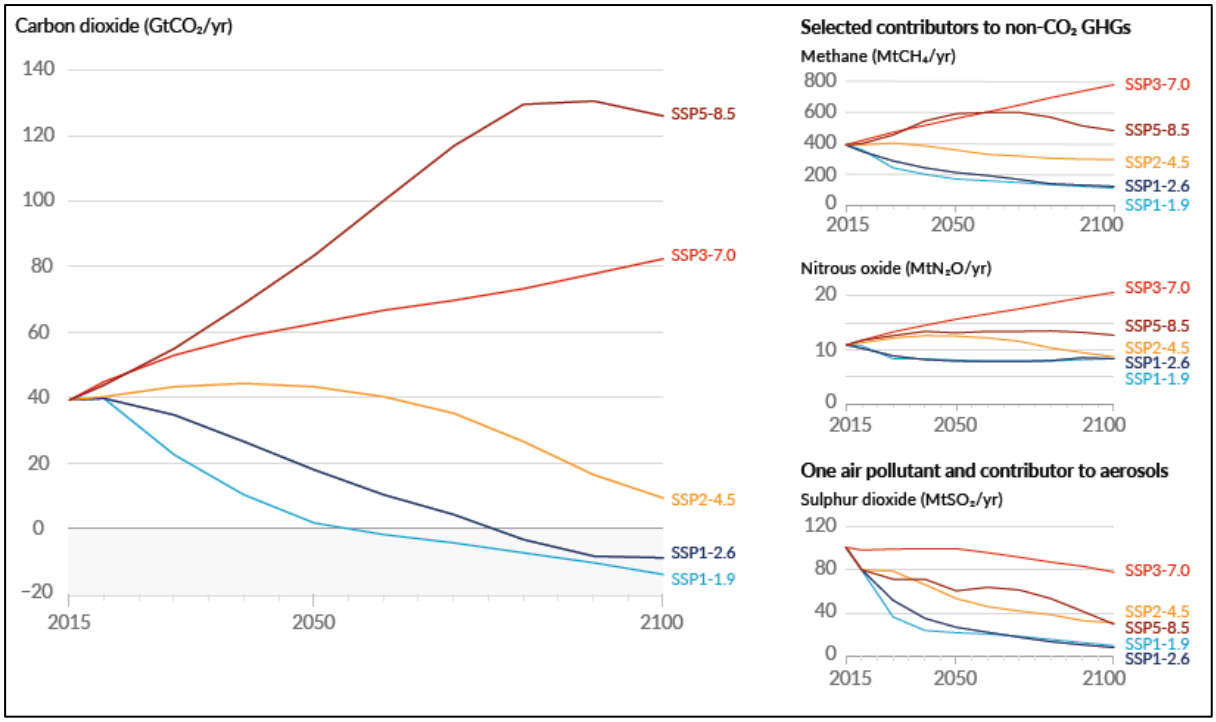


Figure 2-1: Future annual emissions of CO_2 (left) and of a subset of key non-CO_2 drivers (right), across five illustrative scenarios (source: adapted from IPCC AR6 WGI Summary for Policy Makers)

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

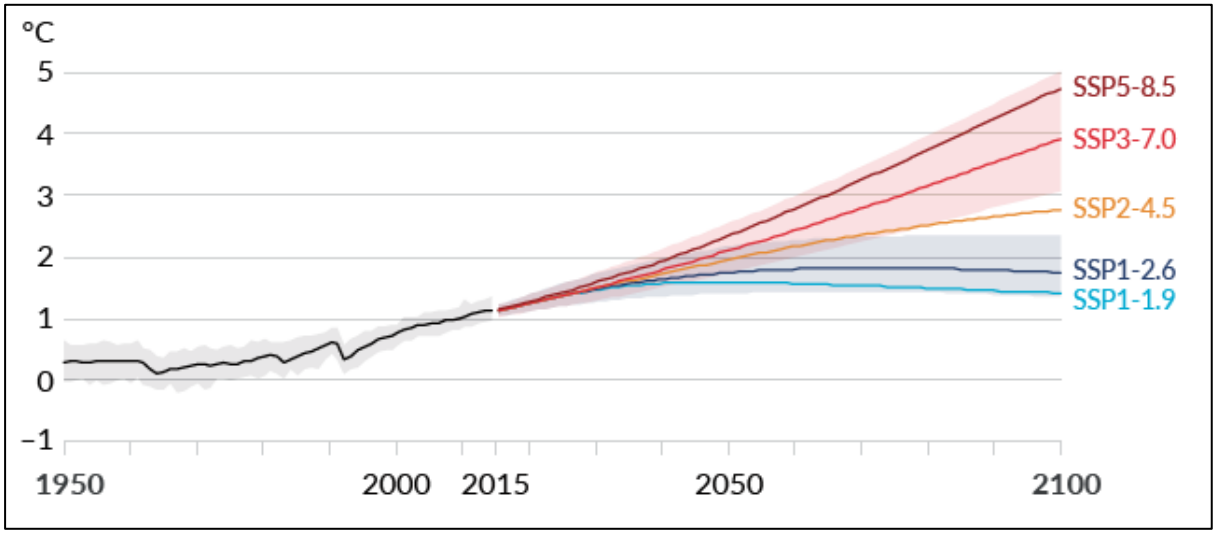


Figure 2-2: global surface temperature change relative to 1850-1900 (source: adapted from IPCC AR6 WGI Summary for Policy Makers)

2.3 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 CO2 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 in this case.

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

PCC Climate Impact Driver Category	IPCC Climate Impact Driver (CID) / Climate-related hazard	IPCC AR6 Summary Findings[9]	IPCC WGI Interactive Atlas Data10 (SSP2-4.5 Scenario)[11]	IPCC WGI Interactive Atlas Data12 (SSP5-8.5 Scenario)[13]
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[14] 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):** Median: 0.1 P25-P75: 0 to 0.2	**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):** Median: 0.5 P25-P75: 0.1 to 0.7

[9] 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.

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

[11] 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.

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

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

[14] 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.

PCC Climate Impact Driver Category	IPCC Climate Impact Driver (CID) / Climate-related hazard	IPCC AR6 Summary Findings[9]	IPCC WGI Interactive Atlas Data10 (SSP2-4.5 Scenario)[11]	IPCC WGI Interactive Atlas Data12 (SSP5-8.5 Scenario)[13]
	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[15]/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)	There is medium confidence that river floods will decrease in Northern Europe under RCP8.5[16] 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 Medium Term (2041-2060):** Median: 5.9% P25-P75: 4.0% to 7.8% **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 Medium Term (2041-2060):** Median: 8.3% P25-P75: 6.0% to 9.5% **Increase in maximum 1-day precipitation amount in Long Term (2081-2100):** Median: 20.2% P25-P75: 14.1% to 24.1%

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

[16] 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.

PCC Climate Impact Driver Category	IPCC Climate Impact Driver (CID) / Climate-related hazard	IPCC AR6 Summary Findings[9]	IPCC WGI Interactive Atlas Data10 (SSP2-4.5 Scenario)[11]	IPCC WGI Interactive Atlas Data12 (SSP5-8.5 Scenario)[13]
			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 P25-P75: 0.1 to 0.11	**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 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[17] 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%

[17] 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.

PCC Climate Impact Driver Category	IPCC Climate Impact Driver (CID) / Climate-related hazard	IPCC AR6 Summary Findings[9]	IPCC WGI Interactive Atlas Data10 (SSP2-4.5 Scenario)[11]	IPCC WGI Interactive Atlas Data12 (SSP5-8.5 Scenario)[13]
	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 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	**Decrease in snowfall (mm/day) in Medium Term (2041-2060):** Median: -3.9 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	**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

PCC Climate Impact Driver Category	IPCC Climate Impact Driver (CID) / Climate-related hazard	IPCC AR6 Summary Findings[9]	IPCC WGI Interactive Atlas Data10 (SSP2-4.5 Scenario)[11]	IPCC WGI Interactive Atlas Data12 (SSP5-8.5 Scenario)[13]
			P25-P75: 0.2 to 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 1-in-50-years by 2050 and between 1-in-5-years and 1-in-20-years by 2100.	*No atlas data available for coastal flooding.*	
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	*No atlas data available for compound events.*	

PCC Climate Impact Driver Category	IPCC Climate Impact Driver (CID) / Climate-related hazard	IPCC AR6 Summary Findings[9]	IPCC WGI Interactive Atlas Data10 (SSP2-4.5 Scenario)[11]	IPCC WGI Interactive Atlas Data12 (SSP5-8.5 Scenario)[13]
		are projected to increase in Europe by mid-century for the Special Report on Emission Scenarios (SRES) A1B and RCP8.5 scenarios.		

2.4 Other Relevant Scientific Based Climate Predictions

2.4.1 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).

2.4.1.1 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[18] 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)).
- 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-

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

2000, rather than the TRANSLATE parameters). As further results come from standardised projects these maps will be replaced.

2.4.1.2 EPA Climate Projections

The EPA's Research Report on Climate Projections for Ireland (Research Report No. 339)[19] 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.

2.4.2 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.

Ireland has seen an increase in average annual national rainfall of approximately 60mm or 5% in the period 1981-2010, compared to the 30- year period 1961-1990. Significant reductions are expected in average levels of annual, spring and summer rainfall. Projections indicate a substantial increase in the frequency of heavy precipitation events in Winter and Autumn (approx. 20%).

The rate of global sea level rise for 2006–2015 of 3.6 mm per year, is unprecedented over the last century, and about 2.5 times the rate for 1901–1990. Sea level is projected to continue to rise at this rate or greater. All major cities in Ireland are in coastal locations subject to tides, any significant rise in sea levels will have major economic, social and environmental impacts.

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

Rising sea levels around Ireland would result in increased coastal erosion, flooding and damage to property and infrastructure.

Other climate change indicators include the following:

- The last five-year (2015–2019) and ten-year (2010–2019) average temperatures are the warmest on record. Since the 1980s, each successive decade has been warmer than any preceding decade since 1850.
- In Ireland, 2019 was the ninth consecutive year with temperatures above normal.
- Ireland has seen a reduction in the number of frost days and shortening of length of the frost season.
- The number of very intense storms is projected to increase over the North Atlantic region. Projections suggest that the winter track of these storms may extend further south and over Ireland more often.
- Sea surface temperature in Irish waters has increased at a rate of approximately 0.6°C per decade since 1994, which is unprecedented in the 150-year observational record.

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 Dun Laoghaire County Council using a combination of the *Climate Ireland* Climate Change Projection Maps[20] and EPA Research Report No. 339[21]. 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

[20] Climate Ireland - Climate Change Projection Maps.

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

reference periods and future periods provide a measure of climate change. The climate scenarios utilised in the assessment are RCP4.5 and RCP8.5.

https://climate-adapt.eea.europa.eu/en/knowledge//tools/urban-ast/step-2-4

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[22]	Climate Model Simulations for Dublin[23] (RCP4.5 Scenario)	Climate Model Simulations for Dublin[23] (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: +1.3ºC Greatest seasonal change in Autumn with an expected increase of +1.6ºC	Mean annual temperature change: +1.7ºC Greatest seasonal change in Autumn with an expected increase of +2ºC
	Surface Humidity (Chronic) (Reference Period 1981-2000; Future period: 2041-2060)	Specific humidity[24] is projected to increase substantially (≈10%) for all seasons by the middle of the century. Relative humidity [25] 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 increase 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[26] (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 for the RCP8.5 scenario. A sustained increase in the daily maximum temperature is associated with heatwaves.	Change in daily max temperature: +1.2ºC Increase in the number of heatwave events: 0.2 to 0.4	Change in daily max temperature: +1.7ºC Increase in the number of heatwave events: 0.3 to 0.5

[22] Climate Ireland - Climate Change Projection Maps. Where a range is given, results are provided for the 10th-90th percentile range of ensemble.

[23] Simulations were run for the reference period 1976-2005 and 1980-2000, and the future periods 2041–2060 and 2041-2070.

[24] 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.

[25] 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[22]	Climate Model Simulations for Dublin[23] (RCP4.5 Scenario)	Climate Model Simulations for Dublin[23] (RCP8.5 Scenario)
	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. Dublin, however, indicates a change of +1% to +5% and -1% to +2% 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-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.	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[22]	Climate Model Simulations for Dublin[23] (RCP4.5 Scenario)	Climate Model Simulations for Dublin[23] (RCP8.5 Scenario)
	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[27] 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[28], 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).*
	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[29] 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)	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%	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

[27] A "wet day" is defined as one on which the daily precipitation amount is greater than 20mm.

[28] A "very wet day" is defined as one on which the daily precipitation is greater than 30mm.

[29] 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[22]	Climate Model Simulations for Dublin[23] (RCP4.5 Scenario)	Climate Model Simulations for Dublin[23] (RCP8.5 Scenario)
	(Reference Period 1981-2000; Future period: 2041-2060)	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 decreases in wind speed and wind power and increases in dry periods and heatwave events.		
	Storm Track Projections[30] (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%

[30] 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[22]	Climate Model Simulations for Dublin[23] (RCP4.5 Scenario)	Climate Model Simulations for Dublin[23] (RCP8.5 Scenario)
Other (Energy Impacts)	Heating degree days[31] (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 8-23% and 15–25% for the RCP4.5 and RCP8.5 scenarios, respectively. Averaged over the whole country, the expected decreases in HDDs are 15% and 20% 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[32] (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.		
	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% (mean -1.04%) in the RCP 4.5 scenario. The largest decreases are noted in the north of the country. The mean change in the RCP 8.5 scenario is -2.19%.	Percentage decrease in mean annual PV: -0.5% to -1.5%	Percentage decrease in mean annual PV: -0.5% to -3%

[31] 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.

[32] Cooling degree days (CDDs) are used to estimate the amount of air conditioning usage during the warm season.

3 CLIMATE RISK SCREENING

3.1 Technical Screening Criteria Requirements

The Commission Delegated Regulation 2021/2139 (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 economic activities:

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.

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 hydrologi-cal variability	Soil degradation
	Temperature variability		Ocean acidification	Soil erosion
	Permafrost thawing		Saline intrusion	Solifluction
			Sea level rise	

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

	Temperature-related	Wind-related	Water-related	Solid mass-related
			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 DLR 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, approximately 3.86 hectares situated on lands at Blackglen Road, Sandyford, Dublin 18. The proposed site access is via the Blackglen Road (R113). There is a proposed emergency entrance via the Woodside Road at the southern boundary. The site is characterised by shrubs and gorse.

The site is largely surrounded by residential one-off dwellings. The site is located approximately 2km southwest of Sandyford. To the north of the site, are further greenfields, an existing residential development and Explorium – National Sport and Science Centre. East of the site are further existing residential developments, one off housing and greenfields. To the south of the site are further one-off housing and fields, and approximately 685m southeast of the site is Fernhill House and Gardens. To the west of the site is predominantly fields with one-off housing.

The Site is located approximately 5km southwest of the Irish Sea at Blackrock where the highest tide level is ca. 4.5 metres above ordnance datum (AOD) (Malin).

According to the Topographical Survey, the Site is generally graded towards south of the site with the highest point of the site being located at the south-west boundary and is approximately +160.12m AOD with lowest the point being located at the northeast boundary of the site and

is approximately +138.72m AOD. This gives a typical gradient of approximately 8.2% across the site.[34]

A Ground Investigation Report[35] was carried out for the Site which investigated subsurface conditions utilising a variety of investigative methods in accordance with the project specification.

The sequence of strata encountered were variable across the site and are generally comprised:

- Topsoil
- Made Ground
- Cohesive Deposits
- Weathered Bedrock
- Bedrock

The full details of the strata encountered during the ground investigation are provided in the Site Investigation Report.

Due to the use of appropriate foundations, as recommended within the Ground Investigation Report[36], the Site will not be prone to subsidence and the topography of the Site and surrounding area would not be prone to landslide risk.

A Site-Specific Flood Risk Assessment (SSFRA)[37] has been carried out for the Proposed Development which considers the potential flood mechanisms at the Site.

Flood zones are defined in the *"Planning System and Flood Risk Management"* Guidelines as *"geographical areas within which the likelihood of flooding is within a particular range"* (OPW, 2009). There are three types or levels of flood zones defined for the purposes of the Flood Guidelines:

- Flood Zone A – where the probability of Developments within these areas are required to comply with the recommendations of the Planning System and Flood Risk Guidelines for Planning Authorities (DoEHLG / OPW 2009) flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);

- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 and 0.5% or 1 in 200 for coastal flooding);

[34] Refer to Site-Specific Flood Risk Assessment, OCSC, November 2024.

[35] Refer to Ground Investigation Report, Ground Investigations Ireland, July 2021.

[36] Refer to Ground Investigation Report, Ground Investigations Ireland, July 2021.

[37] Refer to Site-Specific Flood Risk Assessment, OCSC, November 2024.

- Flood Zone C - where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas on the plan which are not in zones A or B.

The Carrickmines/Shanganagh Stream is located along the south-eastern boundary of the site. The development is set back approximately 25m from the Carrickmines Stream.

In relation to fluvial flooding, the SSFRA has indicated that the proposed buildings for this development are located within Flood Zone C with the exception of the southern site boundary which aligns with Flood Zone A. However, this appears to be confined to the Carrickmines stream channel and no alterations of existing levels in that area will occur.

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. The proposed development includes the construction of a surface water network which consists of Sustainable Urban Drainage Systems (SuDS) measures which will minimise the impact to the receiving environment and manage the pluvial flood risk at the site. The proposed surface water network has been designed with an allowance for climate change as per the DLR CDP 2022-2028. 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. These measures will be implemented and are discussed in Table 4-1 of this Report.

Groundwater flooding occurs when the water table rises above the land surface, this means the natural underground drainage system is incapable of sufficiently draining itself, resulting in the emergence of groundwater at the surface. It generally requires sustained rainfall over relatively longer duration than other forms of flooding, its location is discontinuous, and they can last for weeks or months. The SSFRA has determined that the Proposed Development is at potential risk of groundwater flooding, in the absence of appropriate mitigation. The correct operation and maintenance of the drainage system will be necessary to prevent groundwater flooding. These measures will be implemented and are discussed in Table 4-1 of this Report.

Coastal flooding occurs when dry and low-lying land is submerged by seawater. This can occur due to rising sea levels and/or storm surges. 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.

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[39]. 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, it is recommended that this climate hazard is revisited in line with emerging studies and findings.

- **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, drainage, and other infrastructure. It is anticipated that excavated soil will be reused on site as much as possible.

- Due to the use of appropriate foundations, as recommended within the Ground Investigation Report[40], the Site will not be prone to subsidence.

- Due to the location and topography of the Site, and Ireland's historical and future projected climate, solifluction has been excluded in the long-term.

- According to the Landslide Susceptibility Map developed by Geological Survey Ireland (GSI), the Proposed Development Site ranges from Low to Moderately Low in terms of landslide susceptibility.[41]

- Avalanches are not considered relevant based on Irelands historical and future projected climate.

[38] Climate Central - Coastal Risk Screening Tool

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

[40] Refer to Ground Investigation Report, Ground Investigations Ireland, July 2021.

[41] Geological Survey Ireland - Landslide Susceptibility Map

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

The IPCC Working Group I (WGI) have 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
	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
	Relative sea level	High

Category	CIDs	Impacts and Risk Relevance
COASTAL AND OCEANIC	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	△
	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 CIDs and predicted changes in future climate for Dublin, Ireland 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
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 DLRCC Climate Action Plan (2024-2029) Risk Statement

According to the Dun Laoghaire-Rathdown Climate Action Plan (2024-2029) (DLR 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 DLR. The risk matrix in Figure 3-1 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.

As illustrated in the climate risk matrix (Figure 3-1), projections indicate that the level of risk associated with some hazards (e.g. coastal erosion, coastal, river and pluvial flooding, heatwaves and droughts) will increase while the level of risk will remain the same for others (e.g. severe windstorms and groundwater). Risks associated with some hazards are expected

to decrease due to projected reductions in hazard frequency such as cold spells and heavy snowfalls.

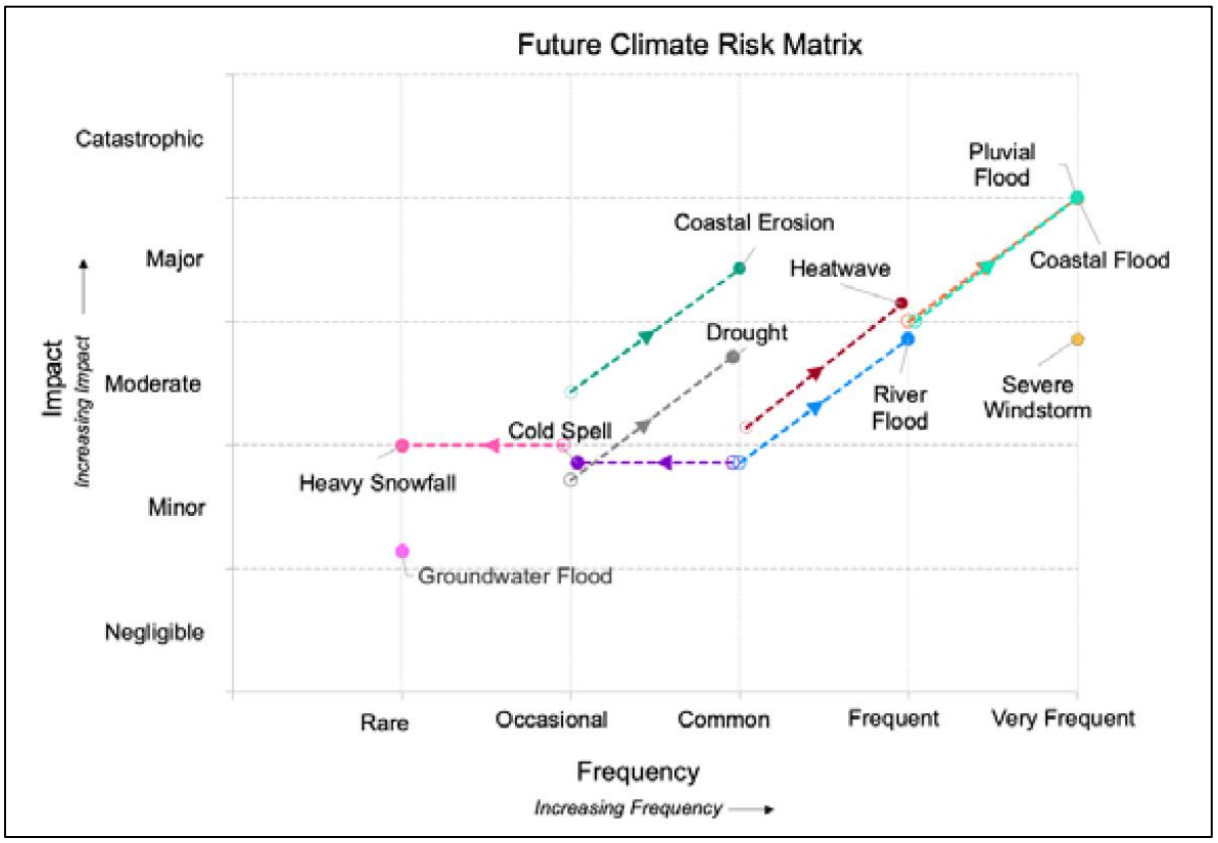


Figure 3-1: Risk matrix showing the future changes in risk for the identified hazards within Dun Laoghaire-Rathdown County (Source: DLR CAP)

The following Table 3-5 has been adapted from the DLRCC Climate Change Adaptation Strategy (DLR CCAS) and identifies future climate hazards and their relevant impact areas.

Table 3-5: Climate Risk Identification (Adapted from DLR CAP)

Climatic Hazard	Future changes in risk	Climate Projection	Risk Statement
Coastal flooding	Projected increase	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 flooding in the county. Rising sea level is strongly linked with increases and extents of coastal erosion.	**Coastal flooding** already poses a significant risk for our County. This has resulted in the temporary flooding of assets, transport disruption and detrimental impacts on protected species and habitats. Rising sea levels will increase the frequency and extent of coastal flooding across the County. Risk associated with coastal erosion is also projected to increase as a result of sea level rise.

Climatic Hazard	Future changes in risk	Climate Projection	Risk Statement
Severe windstorms	No significant change	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.	**Severe windstorms** are currently experienced on a very frequent basis across the County and result in wide-ranging impacts, including damage to power and communication infrastructure, disruption to transport networks and postponement of recreational activities. Projections indicate no significant change to this frequency.
River and pluvial flooding	Projected increase	Projections indicate an increase in the frequency of heavy rainfall days (days with precipitation greater than 30mm) for DLR, with some area projected to see an increase of up to 12.4%. This will likely result in an increased frequency of associated river and pluvial flooding.	Recent experiences of annual **river and pluvial flooding** events between 2018-2022, resulted in damages to buildings, amenities and recreational areas, closure of businesses and disruption of transport networks. Projected increases in the frequency of extreme precipitation events will result in increased surface water and riverine flood risk for the County.
Heatwave and drought	Projected increase	Projections indicate an overall increase in average temperature of between 1.2 and 1.6ºC for DLR 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 with the baseline period of 1981-2000, contributing to potential drought conditions.	The County experienced both a **heatwave** and **drought** in 2018, while a **heatwave** was also recorded in 2022. These events resulted in damage to road surfaces, disruption of public transport networks, increased frequency of uncontrolled fires and increased demand on water resources (resulting in hosepipe bans). Projected increases in the frequency of heatwaves and drought conditions will mean that events currently experienced on an infrequent basis will become more frequent.
Cold spells and heavy snowfall	Projected decrease	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. The annual snowfall in the region is projected to decrease substantially by the middle of the century.	Experiences of **cold spells and heavy snowfall** events in 2018 (e.g. Storm Emma) demonstrated the wide range of impacts for the County. These included, amongst others, road closures, disruption to public transport, power outages and impacts on water r sources (restricted water supply during storm Emma). Projected increases in average temperature and decreases in the frequency of snowfall indicate a decrease in the frequency of cold spells, heavy snowfall, and their associated impacts.

Climatic Hazard	Future changes in risk	Climate Projection	Risk Statement
Groundwater flooding	No significant change	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 risks as determined within the DLR 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).

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 DLR 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 ranges from Low to Moderately Low in terms of landslide susceptibility.	No	**No**
	Hydrological Drought [42] (acute)	None/low confidence	Low confidence in direction of change for Northern Europe. Number of dry periods expected to increase in Dublin.	Yes	**Yes**

[42] 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 DLR 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 DLR 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[43] indicates that the Application Site is located in an area where about 1 in 5 homes in this area are likely to have high radon levels.	No	**Yes**
	Compound flooding	High	The probability of these events is projected to increase along northern European coasts	No	**Yes**

[43] EPA Radon Map for Ireland

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 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~~	

4 CLIMATE RISK AND VULNERABILITY ASSESSMENT

4.1 Technical Screening Criteria Requirements

The Commission Delegated Regulation 2021/2139 (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 economic activities:

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.*

In accordance with 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[44].

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

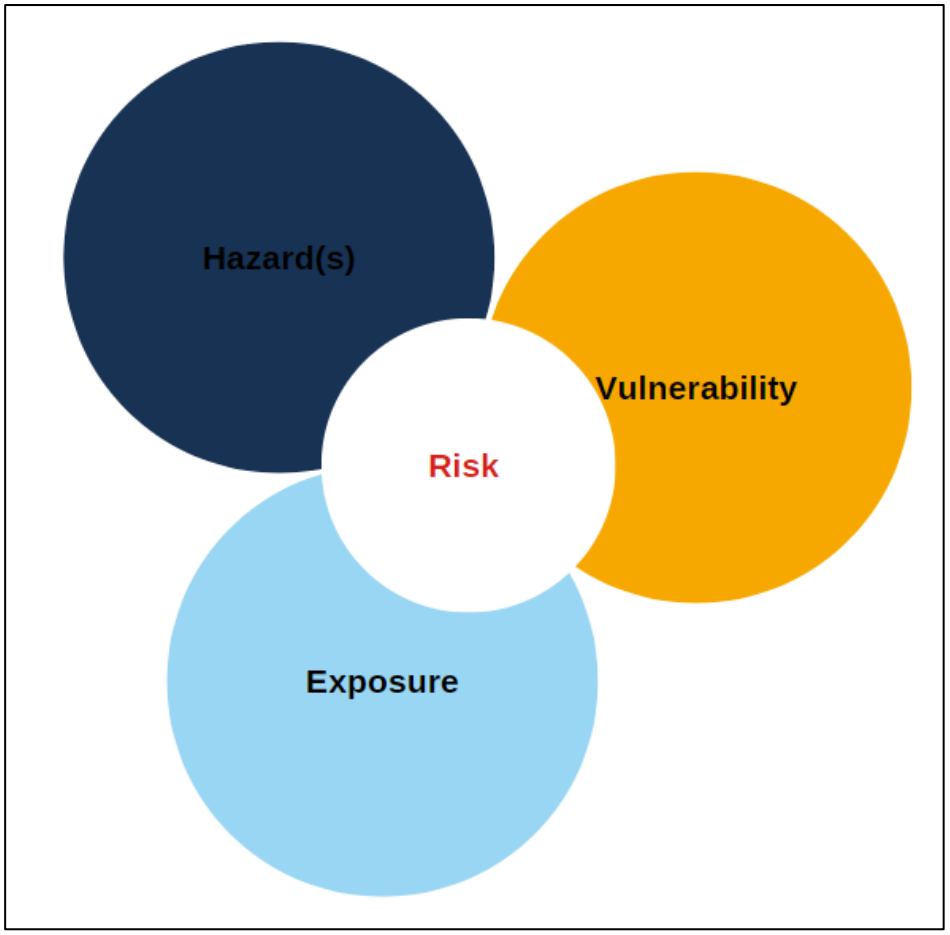


Figure 4-1: IPCC (AR6) Risk Assessment Propeller

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 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.

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*	Increased cooling days for buildings, extra power usage.	Landscaping and the use of trees and plants will shade and contribute to the cooling of the air through evapotranspiration[45]. According to the Energy and Sustainability Report[46], the following measures will be implemented to reduce the energy consumption of the Proposed Development: • High performance U-values; • Improved air tightness; and • Improved thermal transmittance and thermal bridging design. The proposed residential development will comply with residential Part L 2022 (Dwellings), as well as targeting an A3 BER, while the proposed non-residential development will comply with non-residential Part L 2022 (Buildings other Than Dwellings), targeting an A3 BER. An extensive analysis was carried out on the proposed façade to limit the effects of unnecessary solar gains during the summertime period. Figure 5 of the Energy and Sustainability Report illustrates the design intent to provide local shading utilising the building structure which allows glazing areas to be maximised, where required. To improve the overall energy efficiency of the residential aspect of the development, plant is to be selected based on performance and energy efficiency. The plant options for ventilation are:	Low Risk once existing proposed measures are implemented.	Inspection and maintenance of the HVAC systems is carried out periodically and completed in accordance with good practice.

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

[46] Refer to Energy and Sustainability Report, OCSC, November 2024.

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
			• Mechanical Ventilation and Heat Recovery (MVHR), or • Mechanical Extract Ventilation (MEV) via the EAHP. Variable speed drive motors are to be fitted to all fans and pumps servicing all HVAC systems. Standard fans and pumps operate at a constant speed to meet maximum demand even though only half the building may be occupied. VSDs have the ability to ramp up or down depending on the load requirements, thus increasing efficiency. A BEMS (Building Energy Management System) system is to be installed to monitor the use of all major systems in the building. Central BMS will be designed to check metering to monitor & optimise energy usage. The energy management system is expected to review and adjust the operating efficiencies to minimise the overall energy use and carbon emissions. The passive measures included in the design, such as minimising solar gain (glazing selection), high performance U-values, improved air tightness, and improved thermal transmittance and thermal bridging 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.[47]		
	Temperature (acute) *Increase in frequency and duration of heatwave events*	Increased cooling days for 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.	Low Risk once existing proposed measures are implemented.	Inspection and maintenance of the HVAC systems is carried out periodically and completed

[47] Refer to Energy and Sustainability Report, OCSC, November 2024.

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 proposed Blackglen Road Residential Development will be evaluated and analysed with respect to overheating as outlined in Part L 2022 (Dwellings) and CIBSE TM59 (Design Methodology for the Assessment of Overheating Risk in Homes). The non-residential aspects of the proposed Blackglen Road Residential Development will be evaluated and analysed with respect to overheating as outlined in Part L 2022 (Buildings Other Than Dwellings) and CIBSE TM52 (Limits of Thermal Comfort: Avoiding Overheating in European Buildings).[48] To improve the overall energy efficiency of the residential aspect of the development, plant is to be selected based on performance and energy efficiency. The building services strategy for the development has been considered in terms of Part L Compliance (NZEB)[49]. The Proposed Development includes the following energy conservation measures to achieve the most energy effective performance possible: • High performance U-values; • Improved air tightness; and • Improved thermal transmittance and thermal bridging design. The plant options for ventilation are: • Mechanical Ventilation and Heat Recovery (MVHR), or • Mechanical Extract Ventilation (MEV) via the EAHP.		in accordance with good practice.

[48] Refer to Energy and Sustainability Report, OCSC, November 2024.

[49] Refer to Energy and Sustainability Report, OCSC, November 2024.

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 Heating Ventilation Air Conditioning (HVAC) system design has been considered to ensure minimal energy requirements in the building. The proposed HVAC systems are selected based upon their efficiency performance, which has been assessed 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), high performance U-values, improved air tightness, and improved thermal transmittance and thermal bridging 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.[50]		
	Precipitation (acute) *Increase in heavy precipitation and pluvial & river flood*	Pressure on drainage systems.	According to the Site-Specific Flood Risk Assessment[51], the proposed buildings for this development are located within Flood Zone C[52] with the exception of the southern site boundary which aligns with Flood Zone A [53] . However, this appears to be confined to the Carrickmines stream channel and no alterations of existing levels in that area will occur. All finished floor levels have sufficient freeboard to the 100-year flood level. Full Catchment Flood Risk Assessment and Management Study (CFRAMS) maps for the area are included in the SSFRA; the flood maps indicate that the site lies outside the 1 in 100 and 1 in 1000-year fluvial flood extents. The SSFRA has concluded that the	Low Risk once existing proposed measures are implemented.	Conduct a risk assessment, as necessary, when deciding the future location and placement of critical infrastructure. Inspection and maintenance of the drainage systems is carried out periodically and completed in accordance with good practice.

[50] Refer to Energy and Sustainability Report, OCSC, November 2024.

[51] Refer to Site-Specific Flood Risk Assessment, OCSC, November 2024.

[52] Probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding).

[53] Probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).

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
			proposed development is not considered at risk from fluvial flooding. In relation to pluvial flooding, there is no existing surface water drainage network onsite. The Proposed Development includes the construction of a surface water network, as detailed within the Engineering Services Report[54], which consists of Sustainable Urban Drainage Systems (SuDS) measures which will minimise the impact to the receiving environment and manage the pluvial flood risk at the site. The proposed network is to be designed to allow for an additional 20% increase in rainfall intensity, to allow for Climate Change projections, in accordance with the Dun Laoghaire Rathdown County Council Development Plan 2022-2028 and the Greater Dublin Strategic Drainage Study (GDSDS). 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: • Pervious paving; • Bioretention areas; • Green / blue roofs; • Grasscrete; • Trapped road gullies; • Underground pipe network; • Silt traps; • Geocellular storage systems; • Interception storage; • Filter drains; • Flow control device; • Oil separator. The incorporation of the above SuDS elements will provide a sustainable manner in which to disperse		

[54] Refer to Engineering Services Report, OCSC, November 2024.

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
			surface water from the site, encourage groundwater recharge and provide treatment of run-off and subsequent improvement of discharge quality. Refer to the Engineering Services Report for more detail on the drainage design and each of the above-listed SuDS measures[55]. The lowest finish floor level is set accordance with recommended minimum freeboards and in excess of the 100-year flood level plus climate change. Attenuation storage is to be provided for the 100-year return period rainfall event (including an increased 20% rainfall intensity; to allow for climate change). Discharge from site is to be achieved through the use of a vortex flow control device (e.g. Hydro-Brake Optimum, by Hydro-International, or similar approved), which will reduce the risk of blockage present with other flow devices. In the event of storms exceeding the 100-year design capacity of the drainage system, then possible flood routing for overland flows towards open green space to the east should not be blocked.		
	Drought (acute) *Increase in the number of dry periods*	Potential disruption to 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 Irish Water.	Low risk to building. Moderate risk to irrigation of landscaping.	Consider the installation of rainwater harvesting tanks to provide for irrigation and other uses
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 used for the building, and maintenance will take place to ensure all exterior materials are safe and fit for purpose. The use of high-quality materials throughout the development will ensure	Low Risk once existing proposed measures are implemented.	No additional measures proposed. It is recommended to reassess this climate hazard and its potential

[55] Refer to Engineering Services Report, OCSC, November 2024.

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
			long term durability and minimise future maintenance and repair requirements. Bins will be stored in a secure bin storage area, which will prevent the risk of causing harm in high winds.[56] The design and orientation of building take advantage of local climate conditions and the prevailing wind directions have been considered in the design. A conscious effort was made by the design team during the design stages to mitigate the risk of localised increased wind speed conditions due to the proposed development. The introduction of mitigation measures such as the courtyard locations and strategic location of extensive landscaping, assist in reducing the potential development of local increased wind speed and the negative impact on local climatic conditions.[57] The buildings will rely on brick and render as the predominant building material. The buildings are designed in a manner which is consistent with the surrounding environs in terms of height, scale, mass, and form.[58]		risks to buildings should projections in future climate indicate a significant increase in windstorms for this location.
OTHER	**Compound events (acute)** *Increase in the number of compound flooding events*	Increased water runoff and pressure on drainage system	Low risk of flooding on Site[59]. The surface water network, attenuation storage built as part of the master planning, and site levels are designed to accommodate a 100-year storm event and includes climate change provision. The floor levels of the buildings are set above the 100-year flood levels. For storms in excess of 100 years, the development has been designed to provide overland flood routes towards	Low Risk once existing proposed measures are implemented.	Conduct a risk assessment, as necessary, when deciding the future location and placement of critical infrastructure. Inspection and maintenance of the drainage systems is carried

[56] Refer to Operational Waste Management Plan, Enviroguide, December 2024.

[57] Refer to Pedestrian Wind Comfort Study, OCSC, November 2024.

[58] Refer to Design Statement, O'Mahony Pike Architects, June 2024.

[59] Refer to Flood Risk Assessment, OCSC, November 2024.

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 open green space to the east of the site. Refer to OCSC's Site Specific Flood Risk Assessment and Engineering Services Report for further details.[60] In accordance with the GDSDS it is proposed to use Sustainable Urban Drainage systems (SUDS) for managing stormwater for the Proposed Development. The aim of the SUDS strategy for the site will be to: • Attenuate storm-water runoff. • Reduce storm-water runoff. • Reduce pollution impact. • Replicate the natural characteristics of rainfall runoff for the site. 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[61].		out periodically and completed in accordance with good practice.
	Radiation at surface	Risk to human health	The Radon Map for Ireland [62] indicates that the Application Site is located in an area where about 1 in 5 homes in this area are likely to have high radon levels. O'Mahony Pike Architects have confirmed that radon barriers and sumps are to be installed at the lowest levels of all buildings.	Low Risk once existing proposed measures are implemented.	None proposed.

[60] Refer to Flood Risk Assessment, OCSC, November 2024; and Engineering Services Report, OCSC, November 2024.

[61] Refer to Engineering Services Report, OCSC, November 2024.

[62] EPA Radon Map for Ireland

4.3 Mitigation and Adaptation Measures

4.3.1 Mitigation

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.

With consideration to the EU energy performance of Buildings Directive (EPBD), the Building Regulations Technical Guidance Document, Part L (NZEB), for sustainable design and reductions in energy and carbon emissions, the building services design strategy for the Proposed Development utilises sustainable design options and energy efficient systems that are technically, environmentally, and economically feasible for a project of this kind.

A number of strategies will be adopted within the development to maximise low energy use and reduce carbon emissions. Energy and Sustainability Report[63], which has been prepared for the Proposed Development, outlines the elements (based on passive and active measures) that aid in the reduction of energy consumption and carbon emissions, these are as follows:

- **BER Certificates:**
  - The proposed residential development will comply with residential Part L 2022 (Dwellings), as well as targeting an A3 BER, while the proposed non-residential development will comply with non-residential Part L 2022 (Buildings other Than Dwellings), targeting an A3 BER.
- **Building Fabric Performance:**
  - To limit the heat loss through the façade careful consideration must be demonstrated when designing the external façade. The specification of the insulation utilised, and the continuity of insulation are crucial.
  - Improved air tightness/ reduced U values will be targeted to further reduce heat loss through the building fabric which will reduce energy consumption with an associated reduction in carbon emissions.
  - The targeted maximum average elemental U-Values for both the residential and non-residential aspects of the proposed development are outlined in Table 2 and Table 3 of the Energy and Sustainability Report[64].
  - The building air permeability rate for the residential and non-residential aspects of the development will target ≤ 3 m^3/m^2/hr @ 50 pa.

[63] Refer to Energy and Sustainability Report, OCSC, November 2024.

[64] Refer to Energy and Sustainability Report, OCSC, November 2024.

- The Thermal Bridging Factor of 0.08W/m^2. K is being targeted for the residential side of the development, in accordance with Part L (2022) – Dwellings requirements.

- **Daylight and Sunlight:**

  - An extensive analysis was carried out on the proposed façade to limit the effects of unnecessary solar gains during the summertime period.

  - The balance of shading and maximised glazing areas provides both enjoyable and interesting workspaces, full of natural light and without undue solar gains in summertime.

  - The shading coefficient of the glazing units has also been optimised to limit unnecessary solar gains, while allowing as much natural daylight to enter the workspace as possible.

  - Lighting accounts for typically 12% of the overall primary energy. Typically, this is even higher for non-residential spaces. Maximising natural daylighting in the main non-residential areas reduces this demand during daylight hours.

- **Lighting:**

  - The design intent for internal lighting design is to introduce artificial lighting in all applicable areas. Energy efficient light fittings will be installed throughout. The design of the developments façades also allows high levels of natural daylight to enter into occupied zones.

  - A low energy lighting design will reduce energy consumption and increase occupant thermal comfort.

- **Low Energy Plant:**

  - To improve the overall energy efficiency of the residential aspect of the development, plant is to be selected based on performance and energy efficiency.

  - **Space Heating:** The plant options for space heating are:
    - Electric Panel Heaters, or
    - Air Source Heat Pumps (ASHP), or
    - Exhaust Air Heat Pumps (EAHP)
  - **Domestic Hot Water:** The plant options for domestic hot water are:
    - Air Source Heat Pumps (ASHP), or
    - Exhaust Air Heat Pumps (EAHP)

  - **Ventilation:** The plant options for ventilation are:

  - Mechanical Ventilation and Heat Recovery (MVHR), or
  - Mechanical Extract Ventilation (MEV) via the EAHP

- **Variable Speed Drives (VSDs):** Variable speed drive motors are to be fitted to all fans and pumps servicing all HVAC systems. Standard fans and pumps operate at a constant speed to meet maximum demand even though only half the building may be occupied. VSDs have the ability to ramp up or down depending on the load requirements, making this the most efficient auxiliary system to install.

- **Building Energy Management System:**

  - A BEMS (Building Energy Management System) system is to be installed to monitor the use of all major systems in the building. Central BEMS will be designed to check metering to monitor & optimise energy usage. The energy management system is expected to review and adjust the operating efficiencies to minimise the overall energy use and carbon emissions.

- **Renewables**:

  - Solar Photovoltaics (PV) Panels are being considered for inclusion in the Proposed Development. Photovoltaic (PV) Panels convert the solar radiation into electricity, which can be connected to the mains supply of a building. The panels are placed on the roof and are most efficient with an incline angle of 30°. Panels are typically arranged in arrays on building roofs, with the produced electricity fed either directly into the dwelling, office or into the landlord's supply.

The passive measures included in the design, such as minimising solar gain (glazing selection), and 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.

In addition, the sustainable design strategy of the Proposed Development shall include the installation of 47 No. Electric Vehicle (EV) charging points; close proximity to public transportation networks; water efficiency measures such as low consumption sanitary fittings; bicycle facilities; and improved indoor environmental quality.

Furthermore, 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.[65]

4.3.2 Adaptation

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

[65] Refer to Operational Waste Management Plan, Enviroguide, December 2024; Resource & Waste Management Plan, OCSC, November 2024; and Construction Environmental Management Plan (CEMP) OCSC, December 2024.

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.

- 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 from the development towards the open green space to the east of the Site. Additionally, the floor levels of the buildings are set above the 100-year flood levels and in accordance with recommended minimum freeboards.[66] 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. Low level and basement areas should be avoided to prevent potential impacts from pluvial flood events.

- In relation to the increase in windstorms, there is currently uncertainty in the projected change of this climate hazard. Therefore, it is recommended to reassess this climate hazard and its potential risk to buildings should projections in future climate indicate a significant increase in windstorms for this location.

- 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 Zolbury Ltd who have accepted them and committed to implementing them.

[66] Refer to Engineering Services Report, OCSC, November 2024.

5 DO NO SIGNIFICANT HARM (DNSH)

The Taxonomy Regulation requires that activities comply with relevant technical screening criteria which includes the requirement to screen and assess the risks of climate change and the Proposed Development's vulnerability to those risks. In addition to this, the Technical Screening Criteria also establishes a requirement that projects "Do No Significant Harm" (DNSH) to other environmental objectives which are specific to the economic activity.

This report has detailed how the Proposed Development will make a substantive contribution to the environmental objective of Climate Change Adaptation. Additionally, in order to demonstrate compliance with the Taxonomy Regulation, it is required that the following environmental objectives are not adversely affected by the Proposed Development:

- Climate Change Mitigation;
- Sustainable use and Protection of Water and Marine Resources;
- Transition to a Circular Economy;
- Pollution Prevention and Control; and
- Protection and Restoration of Biodiversity and Ecosystems.

Associated DNSH criteria are outlined for each of the above-listed objectives within section 7.1 of Annex II of the Supplementing Regulation. The following Table 5-1 demonstrates how the Proposed Development meets the relevant criteria for DNSH and provides recommendations for additional measures, as necessary.

Table 5-1: Technical Screening Criteria for DNSH

Environmental Objective	DNSH Technical Screening Criteria[67]	Relevant Characteristics of the Proposed Development	Recommended Additional Measures
Climate Change Mitigation	The building is not dedicated to extraction, storage, transport or manufacture of fossil fuels.	The Proposed Development is not dedicated to extraction, storage, transport or manufacture of fossil fuels. Its primary use is the provision of a warehouse unit and office accommodation.	None recommended.
	The Primary Energy Demand (PED) setting out the energy performance of the building resulting from the construction does not exceed the threshold set for the nearly zero-energy building (NZEB) requirements in national regulation implementing Directive 2010/31/EU. The energy performance is certified using an as built Energy Performance Certificate (EPC).	The Energy and Sustainability Report[68] demonstrates the project intention to comply with Part L 2019 NZEB requirements. The Proposed Development is expected to obtain a Building Energy Rating (BER) Certificate of A3.	None recommended.
Sustainable Use and Protection of Water and Marine Resources	Where installed, except for installations in residential building units, the specified water use for the following water appliances are attested by product datasheets, a building certification or an existing product label in the Union, in accordance with the technical specifications laid down in Appendix E to Annex I to this Regulation: a) wash hand basin taps and kitchen taps have a maximum water flow of 6 litres/min; b) showers have a maximum water flow of 8 litres/min; c) WCs, including suites, bowls and flushing cisterns, have a full flush volume of a maximum	The Proposed Development contains residential building units, therefore does not require compliance with this screening criteria. However, all ancillary development will comply with the criteria as laid out in Appendix E to Annex I of this Regulation in relation to the Sustainable use and Protection of Water and Marine Resources. Furthermore, the proposed residential development will incorporate measures to reduce water usage through the appropriate selection of low consumption sanitary fittings, leak detection systems and water monitoring facilities.[69]	None recommended.

[67] As set out in Annex II, Section 7.1 of the Supplementing Regulation.

[68] Refer to Energy and Sustainability Report, OCSC, November 2024.

[69] Refer to Energy and Sustainability Report, OCSC, November 2024.

Environmental Objective	DNSH Technical Screening Criteria[67]	Relevant Characteristics of the Proposed Development	Recommended Additional Measures
	of 6 litres and a maximum average flush volume of 3,5 litres; d) urinals use a maximum of 2 litres/bowl/hour. Flushing urinals have a maximum full flush volume of 1 litre		
	To avoid impact from the construction site, the activity complies with the criteria set out in Appendix B to this Annex.	Enviroguide has carried out a risk-based Hydrological and Hydrogeological Impact Assessment[70] to determine if there is any potential for significant impacts on the receiving water environment, Groundwater Dependant Terrestrial Ecosystems (GWDTE) including the Fitzsimons Woods proposed Natural Heritage Area (pNHA) and designated Natura 2000 sites in the absence of avoidance and mitigation measures. The appropriate standard design measures for the Construction Phase and Operational Phase of the Proposed Development including implementation of the CEMP and SuDS measures within the drainage design will prevent, limit and mitigate the potential for the worst-case scenario to occur. These embedded measures will ensure there is no risk to water quality of the receiving watercourses. The flow contributions to the Carrickmines stream is to remain unchanged from the existing during the operational phase of the scheme. There is no identified risk to water quality associated with the indirect (mains drainage) discharge of foul water from the Proposed Development to the existing mains UE foul drainage network that will ultimately be discharged to the Liffey Estuary Lower via the Ringsend WWTP under appropriate consent from UE. There is no identified impact to the existing WFD status of water bodies associated with the Proposed Development including the Carrickmines Stream_10, Shanganagh_10, downstream waterbodies and the Wicklow GWB as a result of the Proposed Development taking account of design avoidance and mitigation measures that will be implemented as described.	Auditing of the Construction Phase to ensure that environmental management controls are being implemented to prevent pollution.

[70] Refer to Hydrological and Hydrogeological Impact Assessment, Enviroguide, December 2024.

Environmental Objective	DNSH Technical Screening Criteria[67]	Relevant Characteristics of the Proposed Development	Recommended Additional Measures
		Therefore, the Proposed Development activities comply with the criteria set out in Appendix B of Annex II[71].	
Transition to a Circular Economy	At least 70 % (by weight) of the non-hazardous construction and demolition waste (excluding naturally occurring material referred to in category 17 05 04 in the European List of Waste established by Decision 2000/532/EC) generated on the construction site is prepared for reuse, recycling and other material recovery, including backfilling operations using waste to substitute other materials, in accordance with the waste hierarchy and the EU Construction and Demolition Waste Management Protocol. Operators limit waste generation in processes related to construction and demolition, in accordance with the EU Construction and Demolition Waste Management Protocol and taking into account best available techniques and using selective demolition to enable removal and safe handling of hazardous substances and facilitate reuse and high-quality recycling by selective removal of materials, using available sorting systems for construction and demolition waste.	A Resource and Waste Management Plan for the Construction Phase (RWMP)[72] has been prepared which specifies how the waste management and circular economy obligations will be fulfilled. All waste will be managed in accordance with the RWMP. This includes waste ground or surface water, site clearance waste and waste packaging and construction materials generated during construction activities. The management, storage, and removal of soils from the Site will also be carried out in accordance with the RWMP.	Auditing of the Construction Phase to ensure that waste management objectives and recycling targets are being fulfilled.
	Building designs and construction techniques support circularity and in particular demonstrate, with reference to ISO 20887573 or other standards for assessing the disassembly or adaptability of buildings, how they are designed to be more resource efficient, adaptable, flexible and dismantlable to enable reuse and recycling.	The Architectural Design Statement details the adaptability and flexibility of the design, and its resource efficiency[73]. O'Mahony Pike Architects have confirmed that, where possible, the materials will be selected with regards to the sustainable credentials of the manufacturers and products. The mechanical and electrical installations will meet or exceed best practice and current standards. An Operational Waste Management Plan (OWMP) has been prepared to ensure that the management of waste during the	Auditing of the Construction Phase to ensure that environmental management controls are being implemented to prevent pollution.

[71] Appendix 3 of this report contains Appendix B from Annex II of the Supplementing Regulation.

[72] Refer to Resource and Waste Management Plan (RWMP), OCSC, November 2024.

[73] Refer to Design Statement, O'Mahony Pike Architects, June 2024.

Environmental Objective	DNSH Technical Screening Criteria[67]	Relevant Characteristics of the Proposed Development	Recommended Additional Measures
		Operational Phase of the Proposed Development is undertaken in accordance with the current legal and industry standards. In particular, the OWMP aims to provide a robust strategy for storing, handling, collection and transport of the wastes generated at site whilst ensure maximum recycling, reuse, and recovery of waste with diversion from landfill, wherever possible[74].	Auditing of waste management operations during the Operational Phase to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible.
Pollution Prevention and Control	Building components and materials used in the construction comply with the criteria set out in Appendix C to this Annex.	The Proposed Development will not lead to the manufacture, placing on the market or use of any of the substances listed in Appendix C of Annex II[75].	None recommended.
	Building components and materials used in the construction that may come into contact with occupiers emit less than 0,06 mg of formaldehyde per m³ of material or component upon testing in accordance with the conditions specified in Annex XVII to Regulation (EC) No 1907/2006 and less than 0,001 mg of other categories 1A and 1B carcinogenic volatile organic compounds per m³ of material or component, upon testing in accordance with CEN/EN 16516575 or ISO 16000-3576 or other equivalent standardised test conditions and determination methods.	O'Mahony Pike Architects have confirmed that all building components and materials used in the construction of the Proposed Development that may come into contact with occupiers emit less than 0,06 mg of formaldehyde per m³ of material or component upon testing in accordance with the conditions specified in Annex XVII to Regulation (EC) No 1907/2006 and less than 0,001 mg of other categories 1A and 1B carcinogenic volatile organic compounds per m³ of material or component, upon testing in accordance with CEN/EN 16516575 or ISO 16000-3576 or other equivalent standardised test conditions and determination methods.	Auditing of the Construction Phase to ensure that environmental management controls are being implemented to prevent pollution.
	Where the new construction is located on a potentially contaminated site (brownfield site), the site has been subject to an investigation for potential contaminants, for example using standard ISO 18400578.	Ground investigations have been conducted for the Proposed Development Site.[76] The Site currently comprises undeveloped greenfield lands. The excavation and re-use of soil onsite or removal of surplus soils during construction will be subject to control procedures which will include soil quality testing to ensure suitability for use onsite and	Auditing of the Construction Phase to ensure that environmental management controls are being implemented to prevent pollution.

[74] Refer to Operational Waste Management Plan, Enviroguide, December 2024.

[75] Appendix 4 of this report contains Appendix C from Annex II of the Supplementing Regulation.

[76] Refer to Ground Investigation Report, Ground Investigations Ireland, July 2021.

Environmental Objective	DNSH Technical Screening Criteria[67]	Relevant Characteristics of the Proposed Development	Recommended Additional Measures
		for removal offsite in accordance with engineering and environmental specifications for the Proposed Development.	
	Measures are taken to reduce noise, dust and pollutant emissions during construction or maintenance works.	The Construction Environmental Management Plan (CEMP) [77] outlines the measures that will be taken to reduce noise, dust, and pollutant emissions during construction and / or maintenance works.	Auditing of the Construction Phase to ensure that environmental management controls are being implemented to prevent pollution.
Protection and restoration of biodiversity and ecosystems	The activity complies with the criteria set out in Appendix D to this Annex.	In accordance with Appendix D of Annex II[78], an Environmental Impact Assessment Screening Report has been carried out in accordance with Directive 2011/92/EU and the required mitigation and compensation measures for protecting the environment will be implemented[79]. An Appropriate Assessment Screening has also been carried out which has determined that the Proposed Development will not adversely affect any Natura 2000 sites[80].	Auditing of the Construction Phase to ensure that environmental management controls are being implemented to avoid adverse ecological impacts.
	The new construction is not built on one of the following: a) arable land and crop land with a moderate to high level of soil fertility and below ground biodiversity as referred to in the EU LUCAS survey; b) greenfield land of recognised high biodiversity value and land that serves as habitat of endangered species (flora and fauna) listed on the European Red List or the IUCN Red List;	The Site currently comprises scrubland in a suburban area with likely poor soil quality. This land is not recognised as being high biodiversity value and does not serve as a habitat for any endangered species (flora and fauna) listed on the European Red List or the IUCN Red List.[81] Enviroguide have prepared a Wildlife Refuge & Biodiversity Management Plan (WRBMP) for the Site. This Management Plan describes the important ecological features supported by the Site of the Proposed Development, as identified by the surveys carried	Auditing of the Construction Phase to ensure that environmental management controls are being implemented to avoid adverse ecological impacts.

[77] Refer to Construction Environmental Management Plan, OCSC, December 2024.

[78] Appendix 5 of this report contains Appendix D from Annex II of the Supplementing Regulation.

[79] Refer to Environmental Impact Assessment Screening Report, Enviroguide, December 2024.

[80] Refer to Appropriate Assessment Screening Report, Enviroguide, December 2024.

[81] Refer to Ecological Impact Assessment Report, Enviroguide, December 2024.

Environmental Objective	DNSH Technical Screening Criteria[67]	Relevant Characteristics of the Proposed Development	Recommended Additional Measures
	c) land matching the definition of forest as set out in national law used in the national greenhouse gas inventory, or where not available, is in accordance with the FAO definition of forest.	out to date, and details the specific management approaches to be followed for each feature where applicable. A particular focus is given to the Wildlife Refuge proposed along the Site's Southern and eastern boundaries.[82] The land does not match the definition of a forest as set out in national law used in the national greenhouse gas inventory or the FAO definition of forest. Continuous monitoring and inspection will take place during the Construction Phase to ensure that that various environmental protection, waste management, and pollution prevention procedures and targets are implemented and achieved.	

[82] Refer to Wildlife Refuge & Biodiversity Management Plan, Enviroguide, December 2024.

6 Dún Laoghaire Rathdown County Development Plan 2022-2028: Relevant Policy Objectives and associated Sustainable Development Goals

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

The Dún Laoghaire Rathdown County Development Plan 2022-2028 (DLR CDP) 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 DLRCC in relation to climate change and climate change protection measures, particularly in relation to drainage design, and sustainable development, as set out within the Dún Laoghaire Rathdown County Development Plan 2022-2028 (DLR CDP), 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.

Table 6-1: Relevant Policies for Climate Change and Climate Change Protection Measures adapted from DLRCC Development Plan 2022-2028 and associated SDGs

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
SUSTAINABLE DEVELOPMENT			
UN1: United Nations Sustainability Goals	It is a Policy Objective of the Council to contribute, as practicable, via this Plan, towards achievement of the 17 Sustainable Development Goals of the United Nations' 2030 Agenda for Sustainable Development.	This Report has considered the Proposed Development's contribution to the SDGs in the context of the DLR CDP 2022-2028.	All SDGs as listed in Table 1-3 of this Report.
URBAN PLANNING			
CS11: Compact Growth	It is a Policy Objective to deliver 100% of all new homes, that pertain to Dublin City and Suburbs, within or contiguous to its geographic boundary. (Consistent with RPO 3.2 of the RSES).	The Proposed Development will be of mixed-use and is located within the boundary of Dublin City and Suburbs as illustrated within Figure 2.9 of the the DLRCC Development Plan 2022-2028. This supports the local authority objective of providing compact, mixed-use urban development to reduce urban sprawl.	
CLIMATE ACTION			
CA4: Dún Laoghaire Rathdown County Council Climate Change Action Plan 2019-2024 (DLR CCAP)	It is a Policy Objective to implement and take account of the Dún Laoghaire-Rathdown County Council Climate Change Action Plan 2019 - 2024 (DLR CCAP), to take account of the 'Climate Action and Low Carbon Development (Amendment) Act 2021', and subsequent updates of both and to transition to a climate resilient low carbon County.	This Report has considered potential impacts of climate change on the Proposed Development and has implemented and taken account of the Dún Laoghaire-Rathdown County Council Climate Change Action Plan 2024-2029	
CA5: Energy Performance in Buildings	It is a Policy Objective to support high levels of energy conservation, energy efficiency and the use of renewable energy sources in existing and new buildings, including retro fitting of energy efficiency measures in the existing building stock.	A number of low energy technologies are being considered for the development. The proposed approach to achieving Part L (2022)	

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
		Compliance will be based on a combination of the solutions, as detailed in the Energy and Sustainability Report[83]. Through detailed design, a number of sustainability and efficiency features have been considered throughout. The proposed elements (based on passive and active measures) that will aid in the reduction of energy consumption and carbon emissions, are as follows: • BER Certificates. • Fabric Energy Efficiency. • Daylight and Sunlight Optimisation. • Energy Efficient Lighting. • Air Source Heat Pumps. • Exhaust Air Heat Pumps. • Mechanical Heat Recovery Ventilation. • Mechanical Extract Ventilation via the EAHP. • Variable Speed Drives. • Building Energy Management System. • PV Solar Panels. • ECAR Charging Points.	
CA6: Retrofit and Reuse of Buildings	It is a Policy Objective to require the retrofitting and reuse of existing buildings rather than their demolition and reconstruction where possible recognising the embodied energy in existing buildings and thereby reducing the overall embodied energy in construction as set out in the Urban Design Manual (Department of Environment Heritage and Local Government, 2009).	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. A Building Lifecycle Report[84] has been prepared for the Proposed Development on foot of the revised guidelines for Sustainable Urban Housing: Design Standards for New Apartments - Guidelines for Planning Authorities issued under Section 28 of the Planning and Development Act 2000 (as amended). The report reviews the outline specification set out for the proposed residential development and explores the practical implementation of the design and material	

[83] Refer to Energy and Sustainability Report, OCSC, November 2024.

[84] Refer to Building Lifecycle Report, Aramark, November 2024.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
		principles which has informed design of building roofs, façades, internal layouts and detailing of the Proposed Development.	
CA7: Construction Materials	It is a Policy Objective to support the use of structural materials in the construction industry that have low to zero embodied energy and CO_2 emissions.	The proposed Blackglen Road Residential Development will work with industry stakeholders to increase the use of low carbon materials, taking into account international best practice.[85] O'Mahony Pike Architects have confirmed that the use of structural materials with low to zero embodied energy and CO_2 emissions will be achieved as much as is practical.	
CA8: Sustainability in Adaptable Design	It is a Policy Objective to promote sustainable approaches to the improvement of standards for habitable accommodation, by allowing dwellings to be flexible, accessible, and adaptable in their spatial layout and design.	It is important that the design of the proposed Blackglen Road Residential Development individual buildings facilitate a good quality of life for residents and secures long-term sustainability of the overall development. The design of new residential developments should consider not just the immediate needs of the prospective occupants, but also their possible changing needs over the life of the building. This detailed design has been developed with regard to the 12 criteria assessment as set out in the Department of Environment, Heritage Local Government (DoEHLG) Urban Design Manual (May 2009) as follows: 1. Context 2. Connections 3. Inclusivity 4. Variety 5. Efficiency 6. Distinctiveness 7. Layout	

[85] Refer to Energy and Sustainability Report, OCSC, November 2024.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
		8. Public Realm 9. Adaptability 10. Privacy and Amenity Parking 11. Parking 12. Detailed Design The Urban Design Manual focuses on the creation of sustainable high-quality neighbourhoods and as such the residential neighbourhood in this scheme has been described using the 12 criteria as a guiding principle.[86]	
CA9: Radon Gas	It is a Policy Objective, in partnership with other relevant agencies, to promote best practice in the implementation of radon prevention measures.	A High Radon Area is classified by the EPA as any area where it is predicted that 10% or more of homes will exceed the Reference Level of 200 becquerel per cubic metre (Bq/m^3). The Radon Map for Ireland[87] indicates that the Application Site is located in an area where about 1 in 5 homes in this area are likely to have high radon levels. O'Mahony Pike Architects have confirmed that the scheme will be protected against Radon should that be required at Detail Design stage as is a requirement under the Health & Safety Regulations & Building Regulations.	 
CA10: Renewable Energy	Regional, National, and international initiatives and pilot schemes to encourage the development and use of renewable energy sources, including the SEAI Sustainable Energy Community initiatives, as a means of transitioning to a low carbon climate resilient	The proposed approach to achieving Part L (2022) Renewable Energy Compliance will be based on a combination of the solutions as detailed in the Energy and Sustainability Report[88] and listed in Section 4.3 of this Report. Through detailed design, a number of sustainability and efficiency features have been considered throughout. The proposed elements (based on passive and active	

[86] Refer to Design Statement, O'Mahony Pike Architects, June 2024.

[87] EPA Radon Map for Ireland

[88] Refer to Energy and Sustainability Report, OCSC, November 2024.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
	County in line with national renewable energy targets.	measures) that will aid in the reduction of energy consumption and carbon emissions.	
CA13: Solar Energy Infrastructure	It is a Policy Objective to encourage and support the development of solar energy infrastructure, including photo voltaic (PV) and solar thermal and seasonal storage facilities infrastructure in appropriate locations, as a renewable energy resource which can contribute to the transition to a low carbon climate resilient County. It is also a policy objective to support Ireland's renewable energy commitments by facilitating utility scale PV installations for the production of electricity provided they do not negatively impact upon the environmental quality, amenity or heritage of the area.	The proposed approach to achieving Part L (2022) Renewable Energy Compliance will be based on a combination of the solutions as detailed in the Energy and Sustainability Report[89] and listed in Section 4.3 of this Report. Through detailed design, a number of sustainability and efficiency features have been considered throughout. The proposed elements (based on passive and active measures) that will aid in the reduction of energy consumption and carbon emissions.	 
CA14: Energy Storage Systems	It is Policy Objective to support the use of efficient energy storage systems and infrastructure that supports energy efficiency and reusable energy system optimization, in accordance with proper planning and sustainable development when these are undertaken in an environmentally acceptable manner.	The proposed approach to achieving Part L (2022) Renewable Energy Compliance will be based on a combination of the solutions as detailed in the Energy and Sustainability Report[90] and listed in Section 4.3 of this Report. Through detailed design, a number of sustainability and efficiency features have been considered throughout. The proposed elements (based on passive and active measures) that will aid in the reduction of energy consumption and carbon emissions.	
CA16: Low Emission Vehicles	It is a Policy Objective to support and facilitate the rollout of alternative low emission fuel infrastructure through the Development Management process, prioritising electric vehicle infrastructure.	There are 47 no. Electric Vehicle charging spaces proposed as part of the current scheme.[91]	

[89] Refer to Energy and Sustainability Report, OCSC, November 2024.

[90] Refer to Energy and Sustainability Report, OCSC, November 2024.

[91] Refer to Building Lifecycle Report, Aramark, November 2024.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
CA17: Electric Vehicles	It is a Policy Objective to support the Government's Electric Transport Programme by progressively electrifying our mobility systems by facilitating the rollout of Electric Powered Vehicle Recharging Parking Bays across the County and on public roads and other suitable location. The provision of e-bike chargers will be supported subject to the availability of Funding.	There are 47 no. Electric Vehicle charging spaces proposed as part of the current scheme.[92]	
CA18: Urban Greening	It is a Policy Objective to retain and promote urban greening - as an essential accompanying policy to compact growth - which supports the health and wellbeing of the living and working population, building resilience to climate change whilst ensuring healthy placemaking. Significant developments shall include urban greening as a fundamental element of the site and building design incorporating measures such as high-quality biodiverse landscaping (including tree planting), nature-based solutions to SUDS and providing attractive routes and facilities for the pedestrian and cyclist.	Retention and enhancement of biodiversity is proposed which ensures that the natural, cultural, and health requirements of communities are integrated into, and not compromised by, the new development. The landscape design proposals have several aims and objectivities throughout the site. Place making and a sense of identity are central to the landscape proposal and in the design process a number of core aims and objectives were identified and consequently became an integral part of the landscape proposals. The biodiversity objectives are as follows[93]: • To create a native tree trail along the green ribbon and around the boundaries of the development allowing the scheme to integrate well into the existing landscape. • To match tree species growing in the lowlands at Fitzsimons Wood and in the Uplands of the Dublin Mountains in our tree planting scheme. • To provide additional habitats to local fauna by way of badger mounds, newt ponds and an extensive pollinator friendly planting scheme. • To encourage biodiversity learning through the native tree trail and education and information boards that are designed. • To provide bat boxes throughout the site.	  

[92] Refer to Building Lifecycle Report, Aramark, November 2024.

[93] Landscape Design Rationale, Gannon & Associates, October 2024.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
		• To create a wildlife refuge/corridor along the south-eastern boundary. • To create a herbicide free zone as part of the maintenance programme. The Landscape Design Rationale also outlines the following visions for the proposal: • Pollinators: The interconnection of green areas facilitates the movement of pollinators an promotes cross-pollination. • Mammals Preservation: Careful management of green corridors, contributing to the overall health of the ecosystem, especially dedicated to the preservation of mammal species native to Ireland. • Species Diversity: The variety of habitats, such as oak and pine forests, present in the green corridors, offers ideal conditions for a wide range of plant and animal species. • Landscape Preservation: Preserving the rural character of the area and ensuring that the project is not intrusive on the local landscape. Landscaping works include green infrastructure zones; green roofs; roof plant room and general plant areas; photovoltaic panels; landscaped boundary treatment; footpaths; public lighting; and electrical services. According to the Design Statement[94], the clear aim of the proposal is to provide new contribution to housing supply which is a fundamental objective of the Development Plan. The proposed Blackglen Road scheme benefits from a generous provision of existing Green Spaces within travel distance of the site. Those that are within close proximity to the site worth noting are Fitzsimon's Wood to the North and Ticknock to the South. This proposal's new public open green space has been intentionally integrated into the surrounding area's green infrastructure with new pedestrian access proposed along Blackglen Road, creating the	

[94] Refer to Design Statement, O'Mahony Pike Architects, June 2024.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
		possibility for a future connection between Fitzsimon's Woods and Ticknock mountains. The provision of green infrastructure integrates the new development with the existing landscape and allows the opportunity for future links subject to planning. The provision of trees, along with shrub, wildflower, and bulb planting will maximise the environmental benefits and habitat creation. 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: • Pervious paving; • Bioretention areas; • Green / blue roofs; • Grasscrete; • Trapped road gullies; • Underground pipe network; • Silt traps; • Geocellular storage systems; • Interception storage; • Filter drains; • Flow control device; • Oil separator. . 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 Services Report for more detail on the drainage design and each of the above-listed SuDS measures[95].	
ENVIRONMENTAL INFRASTRUCTURE AND FLOOD RISK			

[95] Refer to Engineering Services Report, OCSC, November 2024.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
EI2: Irish Water Enabling Policies	It is a Policy Objective in conjunction with Irish Water to promote and support water conservation and demand management measures among all water users in existing and new developments.	The proposed residential development will incorporate measures to reduce water usage through the appropriate selection of low consumption sanitary fittings, leak detection systems and water monitoring facilities.[96]	
EI3: Wastewater Treatment Systems	It is a Policy Objective that all new developments in areas served by a public foul sewerage network connect to the public sewerage system, either directly or indirectly.	Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for the Proposed Development. Based upon the details provided, Irish water have advised that connection to water and wastewater are feasible subject to upgrades.[97]	
EI4: Water Drainage Systems	It is a Policy Objective to require all development proposals to provide a separate foul and surface water drainage system – where practicable	Separate storm and foul water connection services will be provided for the Proposed Development[98].	

[96] Refer to Energy and Sustainability Report, OCSC, November 2024.

[97] Refer to Confirmation of Feasibility Letter, Uisce Eireann, May 2024.

[98] Refer to Engineering Services Report, OCSC, November 2024.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
			
EI6: Sustainable Drainage Systems	It is a Policy Objective to ensure that all development proposals incorporate Sustainable Drainage Systems (SuDS).	Sustainable urban Drainage Systems (SuDS) are proposed to reduce water runoff[99], these include: • Pervious paving; • Bioretention areas; • Green / blue roofs; • Grasscrete; • Trapped road gullies; • Underground pipe network; • Silt traps; • Geocellular storage systems; • Interception storage; • Filter drains; • Flow control device; • Oil separator.	 
EI9: Drainage Impact Assessment	It is a Policy Objective to ensure that all new development proposals include a Drainage Impact Assessment that meets the requirements of the Council's Development Management Thresholds Information Document and the Stormwater Management Policy.	Issues within the design relating to surface water drainage implications of the scheme have been examined in the Engineering Services Report. This report describes the proposed actions which will improve the stormwater credentials of the scheme[100]. The Engineering Services Report details the proposed drainage strategies. This report describes the criteria used to design the storm water discharge, disposal of foul water, water supply[101].	

[99] Refer to Engineering Services Report, OCSC, November2024.

[100] Refer to Engineering Services Report, OCSC, November 2024.

[101] Refer to Engineering Services Report, OCSC, November 2024.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
		The surface water network, attenuation storage built as part of the master planning, and site levels are designed to accommodate a 100-year storm event and includes climate change provision. The floor levels of the buildings are set above the 100-year flood levels. For storms in excess of 100 years, the development has been designed to provide overland flood routes towards the open green space to the east of the site.	
EI10: Storm Overflows of Sewage to Watercourses	It is a Policy Objective to work alongside Irish Water to minimise the number and frequency of storm overflows of sewage to watercourses and to establish, in co-operation with the adjoining Local Authorities and Irish Water, a consistent approach to the design, improvement and management of these intermittent discharges to ensure that the needs of the Region's receiving waters are met in a cost-effective manner.	Issues within the design relating to surface water drainage implications of the scheme have been examined in the Engineering Services Report. This report describes the proposed actions which will improve the stormwater credentials of the scheme[102].	 
EI12: Waste Management Infrastructure, Prevention, Reduction, Reuse and Recycling (Circular Economy approach)	To ensure new developments are designed and constructed in line with the Council's Guidelines for Waste Storage Facilities	An Operational Waste Management Plan (OWMP) has been prepared to ensure that the management of waste during the Operational Phase of the Proposed Development is undertaken in accordance with the current legal and industry standards. In particular, the OWMP aims to provide a robust strategy for storing, handling, collection and transport of the wastes generated at site whilst ensure maximum recycling, reuse, and recovery of waste with diversion from landfill, wherever possible[103].	

[102] Refer to Engineering Services Report, OCSC, November 2024.

[103] Refer to Operational Waste Management Plan, Enviroguide, December 2024.

Policy Objective	Description	Proposed Development Considerations	Relevant SDGs
EI22: Flood Risk Management	It is a Policy Objective to support, in cooperation with the OPW, the implementation of the EU Flood Risk Directive (20010/60/EC) on the assessment and management of flood risks, the Flood Risk Regulations (SI No 122 of 2010) and the Department of the Environment, Heritage and Local Government and the Office of Public Works Guidelines on 'The Planning System and Flood Risk Management' (2009) and relevant outputs of the Eastern District Catchment and Flood Risk Assessment and Management Study (ECFRAMS Study). Implementation of the above shall be via the policies and objectives, and all measures to mitigate identified flood risk.	An SSFRA[104] 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); • Dun Laoghaire Rathdown County Development Plan 2022 – 2028 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.	

[104] Refer to Flood Risk Assessment, OCSC, November 2024.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusion

To conclude, the Proposed Development at Blackglen Road, Sandyford, Dublin 18, is considered to have met the criteria set out by the Taxonomy Regulation, in regard to being classed as an environmentally sustainable economic activity, such that it has:

- Made a substantive contribution to one of six environmental objectives, in this case Climate Change Adaptation;

- Demonstrated that no significant harm will be made to the remaining five EU Taxonomy environmental objectives.

- Has met minimum safeguards (as set out by the relevant legislation).

- Has demonstrated compliance with the technical screening criteria as set out within the Supplementing Regulation, 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 DLRCC, as set out within their Development Management Thresholds Information Document, 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 Dún Laoghaire Rathdown County Development Plan 2022-2028 (DLR CDP), 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.

This Report can also be utilised by the organisation to prepare for meeting EU sustainability reporting requirements under the Corporate Sustainability Reporting Directive (CSRD) and proposed Corporate Sustainability Due Diligence Directive (CSDD). Specifically, Standard ESRS E1-Climate change within the CSRD and environmental due diligence within the incoming CSDDD. Companies that fall under the scope of the Corporate Sustainability Reporting Directive (CSRD) also must report in their annual reports to what extent their activities are covered by the EU Taxonomy (Taxonomy-eligibility) and comply with the criteria set in the Taxonomy delegated acts (Taxonomy-alignment).

7.2 Recommendations

7.2.1 Climate Risk and Vulnerability

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.

With consideration to the EU energy performance of Buildings Directive (EPBD), the Building Regulations Technical Guidance Document, Part L (NZEB), for sustainable design and reductions in energy and carbon emissions, the building services design strategy for the Proposed Development utilises sustainable design options and energy efficient systems that are technically, environmentally, and economically feasible for a project of this kind.

A number of strategies will be adopted within the development to maximise low energy use and reduce carbon emissions. Energy and Sustainability Report[105], which has been prepared for the Proposed Development, outlines the elements (based on passive and active measures) that aid in the reduction of energy consumption and carbon emissions, these are as follows:

- BER Certificates;
- Building Fabric Performance;
- Daylight and Sunlight Optimisation;
- Energy Efficient Lighting;
- Low Energy Plant including Air Source Heat Pumps, Exhaust Air Heat Pumps; Mechanical Ventilation and Heat Recovery; or Mechanical Extract Ventilation.
- Variable Speed Drives;
- Building Energy Management System;

[105] Refer to Energy and Sustainability Report, OCSC, November 2024.

- Solar PV Panels.

The passive measures included in the design, such as minimising solar gain (glazing selection), and 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.

In addition, the sustainable design strategy of the Proposed Development shall include the installation of 47 No. Electric Vehicle (EV) charging points; close proximity to public transportation networks; water efficiency measures such as low consumption sanitary fittings; bicycle facilities; and improved indoor environmental quality.

Furthermore, 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. [106]

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.

- 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 from the development towards the open green space to the east of the Site. Additionally, the floor levels of the buildings are set above the 100-year flood levels and in accordance with recommended minimum freeboards.[107] However, to account for a worst-case scenario, it is recommended to conduct a risk assessment,

[106] Refer to Operational Waste Management Plan, Enviroguide, December 2024; and Resource & Waste Management Plan, OCSC, November 2024.

[107] Refer to Engineering Services Report, OCSC, November 2024.

as necessary, when deciding the future location and placement of critical infrastructure. Low level and basement areas should be avoided to prevent potential impacts from pluvial flood events.

- In relation to the increase in windstorms, there is currently uncertainty in the projected change of this climate hazard. Therefore, it is recommended to reassess this climate hazard and its potential risk to buildings should projections in future climate indicate a significant increase in windstorms for this location.

- 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 Zolbury Ltd who have accepted them and committed to implementing them.

7.2.2 Do No Significant Harm (DNSH)

DNSH criteria have been addressed and incorporated into the Proposed Development design. In order to further ensure compliance with these criteria, the following measures are recommended:

- Auditing of the Construction Phase to ensure that environmental management controls are being implemented to prevent pollution.

- Auditing of the Construction Phase to ensure that environmental management controls are being implemented to avoid adverse ecological impacts.

- Auditing of the Construction Phase to ensure that waste management objectives and recycling targets are being fulfilled.

- Auditing of waste management operations during the Operational Phase to ensure maximum recycling, reuse, and recovery of waste with diversion from landfill, wherever possible.

8 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,'

Dún Laoghaire Rathdown County Council (DLRCC): Development Management Thresholds Information Document.

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Appendix 1

Site Location and Site Layout



OS MAP SERIES: 1:1000, 1:2500
OS MAP REF: 3455-02, 3455-03, 3455-08, 3456-A (1:2500)
ITM Centre Point Co-ordinate: X,Y = 717585,738197.508
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Site Location Map

- APPLICATION SITE (Circa 3.836 Ha OUTLINED IN RED)
- LANDS IN OWNERSHIP OF APPLICANT (Circa 3.857 Ha OUTLINED IN BLUE)
- CPO LANDS PERMANENT LAND TAKE
- CPO LANDS TEMPORARY LAND TAKE
- PART OCCUPIED BY THIRD PARTY
- LANDS TAKEN IN CHARGE BY DLRCC SUBJECT TO LETTER OF CONSENT (Circa 0.128 Ha HATCHED IN BLUE)

Revision	Description	Date	Rev. by	Check by
Stage 3 - CPO Submission				
Final submission				

All levels are related to datum noted on drawing datum. All dimensions in millimetres. Figured dimensions only are to be taken from this drawing. All work to be carried out in accordance with the current building regulations. All dimensions to be checked on site before work is carried out. All contractors are to be notified of any discrepancies.

Any reference to Fair valley design or performance is provided for construction purposes only. Refer only to the granted Fair Valley Certificate - and the specification, information for Fair Valley design, specification and performance.

*Figured dimensions only to be used. This drawing is copyright of O'Mahony Pike Architects and not information is placed as per agreement use in accordance with S.I.No.9 of 2000, Table 5, Standard Costs for Availability of Models and Documents and Art. 80(1) of the Statute Book is empty, the information has been checked at 90° shift.

O'Mahony Pike
Architecture & Urban Design
Dublin
Cork

Project: Blackglen Road
Location: Blackglen Road, Lambs Cross, Sandyford, Dublin 18
Client: Zoltbury Ltd

Drawing Title: Site Location Map
Drawing No.: 23005A-OMP-00-00-DR-A-2300



Proposed Ground Floor Site Layout Plan

APPLICATION SITE 1.93 ha OUTLINED IN RED

LANDS IN OWNERSHIP OF APPLICANT (Circa 1.622 ha OUTLINED IN BLUE)

CFC LANDS PERMANENT LAND TAKE OUTLINED IN YELLOW

CFC LANDS PERMANENT LAND TAKE OUTLINED IN ORANGE

LANDS TAKEN IN CHARGE BY NIHE SUBJECT TO LETTER OF CONSENT (Circa 0.125 ha HATCHED IN GREEN)

PART ACCURED BY THIRD PARTY (HATCHED IN PURPLE)

mahony pike

Appendix 2

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.

Appendix 3

Appendix B (generic criteria for DNSH to sustainable use and protection of water and marine resources) from Annex II of Commission Delegated Regulation (EU) 2021/2139.

APPENDIX B: GENERIC CRITERIA FOR DNSH TO SUSTAINABLE USE AND PROTECTION OF WATER AND MARINE RESOURCES

Environmental degradation risks related to preserving water quality and avoiding water stress are identified and addressed with the aim of achieving good water status and good ecological potential as defined in Article 2, points (22) and (23), of Regulation (EU) 2020/852, in accordance with Directive 2000/60/EC[670] and a water use and protection management plan, developed thereunder for the potentially affected water body or bodies, in consultation with relevant stakeholders. Where an Environmental Impact Assessment is carried out in accordance with Directive 2011/92/EU and includes an assessment of the impact on water in accordance with Directive 2000/60/EC, no additional assessment of impact on water is required, provided the risks identified have been addressed.

[670] For activities in third countries, in accordance with applicable national law or international standards which pursue equivalent objectives of good water status and good ecological potential, through equivalent procedural and substantive rules, i.e. a water use and protection management plan developed in consultation with relevant stakeholders which ensures that 1) the impact of the activities on the identified status or ecological potential of potentially affected water body or bodies is assessed and 2) deterioration or prevention of good status/ecological potential is avoided or, where this is not possible, 3) justified by the lack of better environmental alternatives which are not disproportionately costly/technically unfeasible, and all practicable steps are taken to mitigate the adverse impact on the status of the body of water.

Appendix 4

Appendix C (generic criteria for DNSH to pollution prevention and control regarding use and presence of chemicals) from Annex II of Commission Delegated Regulation (EU) 2021/2139.

APPENDIX C: GENERIC CRITERIA FOR DNSH TO POLLUTION PREVENTION AND CONTROL REGARDING USE AND PRESENCE OF CHEMICALS

The activity does not lead to the manufacture, placing on the market or use of:

(a) substances, whether on their own, in mixtures or in articles, listed in Annexes I or II to Regulation (EU) 2019/1021, except in the case of substances present as an unintentional trace contaminant;

(b) mercury and mercury compounds, their mixtures and mercury-added products as defined in Article 2 of Regulation (EU) 2017/852;

(c) substances, whether on their own, in mixture or in articles, listed in Annex I or II to Regulation (EC) No 1005/2009;

(d) substances, whether on their own, in mixtures or in an articles, listed in Annex II to Directive 2011/65/EU, except where there is full compliance with Article 4(1) of that Directive;

(e) substances, whether on their own, in mixtures or in an article, listed in Annex XVII to Regulation (EC) 1907/2006, except where there is full compliance with the conditions specified in that Annex;

(f) substances, whether on their own, in mixtures or in an article, meeting the criteria laid down in Article 57 of Regulation (EC) 1907/2006 and identified in accordance with Article 59(1) of that Regulation, except where their use has been proven to be essential for the society;

(g) other substances, whether on their own, in mixtures or in an article, that meet the criteria laid down in Article 57 of Regulation (EC) 1907/2006, except where their use has been proven to be essential for the society.

Appendix 5

Appendix D (Generic Criteria for DNSH to Protection and Restoration of Biodiversity and Ecosystems) from Annex II of Commission Delegated Regulation (EU) 2021/2139.

APPENDIX D: GENERIC CRITERIA FOR DNSH TO PROTECTION AND RESTORATION OF BIODIVERSITY AND ECOSYSTEMS

An Environmental Impact Assessment (EIA) or screening[671] has been completed in accordance with Directive 2011/92/EU[672].
Where an EIA has been carried out, the required mitigation and compensation measures for protecting the environment are implemented.
For sites/operations located in or near biodiversity-sensitive areas (including the Natura 2000 network of protected areas, UNESCO World Heritage sites and Key Biodiversity Areas, as well as other protected areas), an appropriate assessment[673], where applicable, has been conducted and based on its conclusions the necessary mitigation measures[674] are implemented.

671 The procedure through which the competent authority determines whether projects listed in Annex II to Directive 2011/92/EU is to be made subject to an environmental impact assessment (as referred to in Article 4(2) of that Directive).

672 For activities in third countries, in accordance with equivalent applicable national law or international standards requiring the completion of an EIA or screening, for example, IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks.

673 In accordance with Directives 2009/147/EC and 92/43/EEC. For activities located in third countries, in accordance with equivalent applicable national law or international standards, that aim at the conservation of natural habitats, wild fauna and wild flora, and that require to carry out (1) a screening procedure to determine whether, for a given activity, an appropriate assessment of the possible impacts on protected habitats and species is needed; (2) such an appropriate assessment where the screening determines that it is needed, for example IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

674 Those measures have been identified to ensure that the project, plan or activity will not have any significant effects on the conservation objectives of the protected area.