MWP

Chapter 13 Air Quality and Climate

An Rínn Rua Hotel and Leisure Park

County Kerry

Farm

Rinn Rua Holiday Park Ltd

April 2024

Contents

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MWP

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13. Air and Climate

13.1 Introduction

This chapter describes and evaluates the effect which the Proposed Development may have on Air Quality and Climate as defined in the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

The chapter describes the potential effects to ambient air quality from the proposed development, which is located on the Iveragh Peninsula, between the coastal town of Waterville and Ballinskelligs village, on the shores of Ballinskelligs Bay, in the Uíbh Ráthaigh Gaelteact. Particular attention is given to the potential exposure of receptors to airborne pollutants resulting from the development and operation of the subject site. In addition, a number of ecological sensitive habitats designated under the EU Habitats and Birds Directive were included within the assessment. The subject matter of climate change is also considered.

A detailed description of the proposal is presented in Chapter 2 of the EIAR.

13.1.1 Competency of Assessor

The assessment has been prepared by Kieran Barry.

Kieran Barry (BEng, PgDip) of MWP. Kieran holds a Degree in Civil and Structural Engineering as well as a Post Graduate Diploma in Environmental Protection. Kieran is an experienced environmental consultant with 8 years experience working on environmental projects. Kieran works on a variety of infrastructure projects conducting environmental assessments and supporting the delivery of a number of environmental deliverables including Environmental Impact Assessment (EIA) Screening Reports, feasibility and constraints studies, route option assessments and Environmental Impact Assessment Reports (EIAR), including Air Quality and Climate EIAR Chapters.

13.1.2 Guidelines and Legislation

The assessment has been prepared in accordance with the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA 2022), as well as guidelines and legislation outlined below:

13.1.2.1 Air Quality

The statutory ambient air quality standards in Ireland are set out in the Ambient Air Quality Standards Regulations 2022, which incorporate the ambient air quality limits set out in Directive 2008/50/EC of the European Parliament and of the Council (21st May 2008) on ambient air quality and cleaner air for Europe (hereafter referred to as the CAFÉ Directive) (as amended by Directive EU 2015/1480), for a range of air pollutants. These are discussed further in Section 13.2.1.1.

In addition to the specific statutory air quality standards, the assessment has been prepared in accordance with national guidelines, where available, in addition to international standards and guidelines. These are summarised below:

- *Institute of Air Quality Management (IAQM) guidance document 'Guidance on the assessment of dust from demolition and construction' (IAQM, 2024); and*
- *Clean Air Strategy (Government of Ireland 2023);*

- *Air quality assessment of proposed national roads – Standard' and 'Air quality assessment of specified infrastructure projects – overarching technical document' (TII, 2022);*
- *UK Department of Environment Food and Rural Affairs (DEFRA) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM.TG (16) (DEFRA 2018);*
- *UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) – LA 105 Air Quality (UKHA 2019); and*
- *World Health Organization (WHO) Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide Global Update 2005 (WHO 2005).*

13.1.2.2 Climate

This assessment has been prepared in accordance with national guidelines, where available, in addition to international standards and guidelines relating to the assessment of Greenhouse Gas (GHG) emissions and associated climatic impact. References to legislation include amendments thereto. These are summarised below:

- *DCCAE (2017) National Adaption Plan;*
- *DCCAE (2024) Climate Action Plan 2024;*
- *Department of Transport, Tourism and Sport (DTTAS) (2019) Transport – Climate Change Sectoral Adaption Plan;*
- *Climate Action and Low Carbon Development (Amendment) Act 2021 (No.46 of 2015) (hereafter referred to as the 2021 Climate Act);*
- *Clare County Council's Climate Change Adaption Strategy 2019-2024;*
- *Clare County Development Plan 2023-2029;*
- *European Commission (EC) (2014) 2030 Climate and Energy Policy Framework;*
- *UKHA (2019) Design Manual for Roads and Bridges: A 114 – Climate;*
- *European Green Deal (EC, 2022);*
- *Kyoto Protocol (United Nations Framework Convention on Climate Change (UNFCC, 1997);*
- *Paris Agreement (UNFCC, 2015);*
- *The Climate Action and Low Carbon Development (Amendment) Act 2021;*
- *Climate Action Plan 2023 (CAP) (DCCAE, 2022);*
- *Glasgow Climate Pact (COP26);*
- *Summary of Global Climate Action at COP 27 (UNFCC, 2022).*

13.1.2.3 Local Policy and Guidelines

<u>Air Quality</u>

The Kerry County Development Plan 2022-2028 sets out the following objectives in terms of Air Quality:

KCDP 11-31 Improve and maintain good air quality and support measures to prevent harmful effects on human health and environment in our urban and rural areas.

KCDP 11-32 Promote the development of energy efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions and promotion of measures that improve air quality including provision and management of green infrastructure.

KCDP 11-33 Promote a model change from private car use to other types of travel and to promote the use of public transport as a means of reducing greenhouse gas emissions and improving air quality.

Climate

The current Kerry County Council Climate Change Adaptation Strategy 2019-2024 outlines the Proposed Adaptation Strategy that Kerry County Council will implement to adapt to the effects of climate and to safeguard the biophysical infrastructure and well-being of the people and communities of County Clare. The main goals of the adaption plan are as follows:

Infrastructure and Built Environment

Increase capacity for climate resilient infrastructure, centred around the effective management of climate risk, informed investment decisions and positive contribution towards a low carbon society.

Landuse and Development

Sustainable policies and measures are devised and implemented to influence positive behavioural changes, support climate adaptation actions and endorse approaches for successful transition to a low carbon and climate resilient society.

Drainage and Flood Management

Create an understanding of risks and consequences of flooding and successful management of a co-ordinated approach to drainage and flooding.

Natural Resources and Cultural Infrastructure

Foster and implement meaningful approaches to protecting natural and key cultural assets through an appreciation for the adaptive capacity of the natural environment to absorb the impacts of climate change.

Community Health and Wellbeing

To develop empowered and cohesive communities with a strong understanding of climate risks, increased resilience to impacts of climate change with capacity to champion climate action at local level.

13.2 Scope and Methodology of Assessment

This report has been prepared in accordance with the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022). Potential effects have been described with regard to Table 3.4 of the guidelines.

The study consists of the following components:

- Review of background ambient air quality in the vicinity of the application area using available collected baseline and reference data generated by the EPA and other referenced sources;
- Assessment of other potential air quality effects such as construction dust and emissions from construction, operational phase traffic and operational process emissions associated with the proposed plant;
- Assessment of proposed development effects on climate;
- Assessment of climate change on the proposed development.

13.2.1 Criteria for Rating of Effects

13.2.1.1 Ambient Air Quality Standards

The Environmental Protection Agency manages the ambient air quality monitoring network. In order to protect our health, vegetation and ecosystems, EU directives set down air quality standards in Ireland and the other member states for a wide variety of pollutants. These rules include how we should monitor, assess and manage ambient air quality.

The Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC) was published in May 2008 and was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values, refer to Table 13-1.

Table 13-1 Limit Values of CAFÉ Directive 2008/50/EC

Pollutant	Limit Value Objective	Averaging Period	Limit Value ug/m3	Basis of Application of the Limit Value
SO_2	Protection of human health	1 hour	350	Not to be exceeded more than 24 times in a calendar year
SO_2	Protection of human health	24 hours	125	Not to be exceeded more than 3 times in a calendar year
SO_2	Protection of vegetation	calendar year	20	Annual mean
SO_2	Protection of vegetation	1 Oct to 31 Mar	20	Winter mean
NO_2	Protection of human health	1 hour	200	Not to be exceeded more than 18 times in a calendar year
NO_2	Protection of human health	calendar year	40	Annual mean
$NO + NO_2$	Protection of ecosystems	calendar year	30	Annual mean
PM_{10}	Protection of human health	24 hours	50	Not to be exceeded more than 35 times in a calendar year
PM_{10}	Protection of human health	calendar year	40	Annual mean
$PM_{2.5}$ -	Protection of human health	calendar year	25	Annual mean
$PM_{2.5}$ -	Protection of human health	calendar year	20	Annual mean
Lead	Protection of human health	calendar year	0.5	Annual mean
Carbon Monoxide	Protection of human health	8 hours	10,000	Not to be exceeded
Benzene	Protection of human health	calendar year	5	Annual mean

13.2.1.2 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust which are less than 10µm in size and the EU ambient air quality standards outlined in Table 13-1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regard to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction and operation phase of a development in Ireland.

However, guideline for dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/m^2/day) averaged over a one month monitoring period at any receptor outside the site boundary. Recommendations from the Department of the Environment, Health and Local Government (DOEHLG, 2004) apply the Bergerhoff limit of 350 mg/m^2/day to the site boundary for quarries. This limit value will be implemented with regard to dust effects from construction phase of the Proposed Development.

This limit value of 350 mg/m2/day has also been incorporated into Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006) and the Irish Concrete Federation Environment Code (ICF, 2005).

13.2.1.3 Climate Agreements

Ireland is party to both the United Nations Framework Convention on Climate Change (UNFCC) and the Kyoto Protocol. The Paris Agreement, which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2^{o}C above pre-industrial levels with efforts to limit this rise to 1.5^{o}C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to GHG emissions will take longer for developing countries. Contributions to GHG emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant process was also made in the Paris Agreement on elevating adaption onto the same level as action to cut and curb emissions.

In order to meet the commitments under the Paris Agreement, the EU enacted *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013 (the Regulation).* The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30% respectively, by 2030 compared to 2005. Ireland's obligation under the Regulation is a 30% reduction in non-ETS greenhouse gas emissions by 2030 relative to its 2005 levels.

In 2015, the Climate Action and Low Carbon Development Act 2015 (No.46 of 2015) (Government of Ireland, 2015) was enacted (The Act). The purpose of the Act was to enable Ireland '*to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050*' (3.(1) of No.46 of 2015). This is referred to in the Act as the 'national transition objective'. The Act made provision for, inter alia, a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019a). The Climate Action Plan 2019 outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadside measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published second Climate Action Plan in November 2021. The plan contains similar elements as the 2019 CAP and aims to set out how Ireland can reduce our greenhouse gas emissions by 51% by 2030 (compared to 2018 levels) which is in line with the EU ambitions, and a longer-term goal of to achieving net-zero emissions no later than 2050. The 2021 CAP outlines that emissions from the Built Environment Sector must be reduced to 5 – 5 MtCO$_2$e by 2030 in order to meet our climate targets. This will require further measures in addition to those committed to in the 2019 CAP. This will include phasing out the use of fossil fuels for the space and water heating of buildings, improving the fabric and energy of our buildings, and promoting the use of lower carbon alternatives in construction.

Following on from Ireland declaring a climate and biodiversity emergency in May 2019 and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme for the Climate Action (Amendment) Bill 2019 in December 2019 followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 (No.32 of 2021) (hereafter referred to as the 2021 Climate Act) in July 2021 (Government of Ireland, 2021b. The 2021 Climate Act was prepared for the purposes of giving effect to the core objectives stated within the CAP.

The purpose of the 2021 Climate Act was to provide for the approval of plans *'for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050'. The 2021 Climate Act also aimed to 'provide for carbon budgets and a decarbonisation target range for certain sectors of the economy'*. The 2021 Climate Act defines the carbon budget as *'the total amount of greenhouse gas emissions that permitted during the budget period'*. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies.

The most recent published Climate Action Plan is CAP 2024, is the third annual update to Ireland's Climate Acton. The Plan was approved on 20 December 2023.
The Climate Action Plan 2024 aims to close the emissions gap and provide the roadmap for delivering on Irelands climate action ambitions. The plan includes an annex of actions to achieve targets, a summary of which are set out as follows:

- Adaptation: Develop a New Adaptation Framework, improve resilience of Ireland's water infrastructure using nature-based solutions and assess the potential effects of climate change on flooding and flood risk across Ireland.
- Agriculture : Develop ecosystem services through a new national carbon farming framework and incorporate the Teagasc 2023 marginal abatement cost curve into the Plan.
- Built Environment (residential): Develop legislation to regulate for a district heating model that delivers consumer protection and a vibrant district heating industry and increase the number of registered One Stop Shops and Sustainable Energy Communities.
- Circular Economy: go-live on the Deposit Return Scheme (now live as of 1st February 2024) and develop a new levy on a single-use packaging, focusing on disposable cups for cold drinks.
- Citizen Engagement: support climate literacy through primary, secondary and third-level education.
- Electricity: Adopt the Electricity Storage Policy Framework, incentivise and enable large energy users to join flexible demand initiatives, publish Revised Wind Energy Development Guidelines for onshore wind, and deliver onshore and offshore Renewable Electricity Support Scheme (RESS) auctions as per the annual RESS auction calendar.
- Industry: develop a work programme to implement the National Hydrogen Strategy and implement the Decarbonisation Roadmap for Industrial Heat based on the recommendations of the Sustainable Energy Authority of Ireland National Heat Study.
- Just Transition: develop green skills and capacities required for a net-zero economy through Education and Training Boards, and specifically for the Midlands – support through Education and Training Boards, and specifically for the Midlands – support economic diversification and the restoration & rehabilitation of degraded bogs.

- **Local Government**: adopt all local authority climate action plans and develop decarbonising zones.
- **Land Use and Land Use Change and Forestry (LULUCF)**: Implement the new Forest Strategy Implementation Plan (including the latest Forestry Programme).
- **Marine Environment**: Design and initiate the national process for achieving 30% Marine Protected Areas coverage by 2030.
- **Public Sector leading by example**: roll-out climate related training for all civil service grades.
- **Research and Innovation**: progress developing the proposed offshore renewable energy innovation park, and
- **Transport**: focus on alternative fuels, enhance rail to port connectivity and speed up implementation of smart and sustainable mobility projects.

13.2.2 Construction Phase

13.2.2.1 Air Quality

Dust Assessment

The Institute of Air Quality Management in the UK (IAQM) guidance document 'Guidance on the Assessment of Dust from Demolition and Construction' (2024) outlines an assessment method for predicting the effect of dust emissions from demolition, earthworks, construction and haulage activities based on the scale and nature of the works and the sensitivity of the area to dust effects. The IAQM methodology has been applied to the construction phase of this development to predict the likely risk of dust effects in the absence of mitigation measures and to determine the level of site-specific mitigation required. Transport Infrastructure Ireland (TII) recommends the use of IAQM guidance in the TII guidance document Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022a).

The major dust generating activities are divided into four types within the IAQM guidance (2024) to reflect their different potential effects. These are:

- Demolition;
- Earthworks;
- Construction; and
- Track-out (movement of heavy vehicles).

The magnitude of each of the four categories is divided into Large, Medum or Small scale depending on the nature of activities involved. The magnitude of each activity is combined with the overall sensitivity of the area to determine the risk of dust effects from site activities. This allows the level of site-specific mitigation to be determined.

Construction Phase Traffic

Construction phase traffic also has the potential to effect air quality and climate. The UK Design Manual for Road and Bridges (DMRB) guidance LA 105 Air quality, states that road links meeting one or more of the following criteria can be defined as 'affected' by a proposed development and should be included in the local air quality assessment. The following are the criteria outlined under the DMRB guidance:

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;

- A change in speed band; and,
- A change in carriageway alignment by 5m or greater.

The construction stage traffic does not meet the above scoping criteria and therefore, has been scoped out from any further assessment as there is no potential for significant effects.

13.2.2.2 Climate

GHG Emissions

The effect of the construction phase of the proposed development on climate was determined by a qualitative assessment of the nature and scale of GHG generating construction activities associated with the proposed development.

13.2.3 Operational Phase

13.2.3.1 Air Quality

The assessment of air quality was carried out by assessing how likely the emissions from the proposed development risk failing to achieve air quality standards. In this assessment, an initial scoping of possible key pollutants was carried out. The latest available EPA report summarising Air Quality in Ireland (Air Quality in Ireland 2021) found that levels of Sulphur Dioxide (SO2), Benzene and CO were well below Ambient Air Quality Standards, and therefore these pollutants are considered not a main threat to good air quality in Ireland. The report found that fine particular mater (PM2.5), mainly from burning solid fuel in homes and nitrogen dioxide (NO2) are the main threats to good air quality in Ireland. The key pollutants reviewed in this assessment are therefore NO2, PM10, PM2.5, benzene and CO, with particular focus on NO2 and PM10.

Traffic

Transport Infrastructure Ireland guidance states that the assessment must progress to detailed modelling if:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills, etc.).

As is the case with the construction phase, the UK DMRB guidance considers road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment:

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- A change in speed band;
- A change in carriageway alignment by 5m or greater.

The operational phase traffic has been reviewed and none of the impacted road links meet the above criteria. Therefore, a quantitative assessment of the effect of traffic emissions on ambient air quality is not necessary.

Ecological Sites

TII guidance (TII, 2022a) provides some methodology for assessing effects to ecologically designated sites from air quality effects from increased traffic emissions.

For road transport sources within 200m of a designated habitat, individual ecological receptors along a transect of 10 intervals are to be modelled. Ecological receptors are modelled up to a maximum of distance of 200m regardless of whether the habitat extends beyond 200m. It is considered that the greatest effects will occurr in proximity to the road. The TII guidance (TII, 2022a) notes that only sites that are sensitive to nitrogen and acid deposition need to be included in the assessment, it is not necessary to include sites for example that have been designated as a geological feature or watercourse.

The Ballinskelligs Bay and Inny Esturary SAC and Ballinskelligs Bay and Inny Estuary pNHA are located within 200m of the access road to Reenroe beach. Due to the proximity to the SAC, an assessment of the effect with regard to nitrogen oxide (NOx) concentrations and nitrogen deposition was conducted using the TII REM Tool.

The Air Quality Regulations outline an annual critical level for NOx for the protection of vegetation and natural ecosystems in general. The CAFÉ Directive defines 'Critical Levels' as a 'level fixed on the basis of scientific knowledge, above which direct negative effects may occur on some receptors, such as trees, other plants or natural ecosystems but not on humans.

The United Nations Economic Commission for Europe (UNECE) Critical Loads for Nitrogen defines a 'Critical Load' as a 'a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge (UNECE, 2003. The UNECE also provides critical loads within the subsequently updated in the 2010 Review and Revision of Empirical Critical Loads and Dose-Response Relationships (UNECE, 2010).

The TI guidance (TII, 2022a) recommends the use of the EPA's research papers 'Research 323: Critical Loads and Soil-Vegetation Modelling' (EPA, 2020) and 'Research 390: Nitrogen-Sulfur Critical Loads: Assessment of the Impacts of Air Pollution on Habitats' (EPA, 2021) provides information regarding background concentrations and critical loads.

The TII guidance (TII, 2022a) outlines a methodology to derive the road contribution to dry deposition and thereafter to compare with the published critical loads for appropriate habitat. In order to calculate the nitrogen deposition, the Nox/NO2 concentration determined through modelling including the background concentration must be converted firstly into a dry deposition flux using the equation below which is taken from the UK Environment Agency publication 'AGTAG06 – Technical Guidance on Detailed Modelling Approach For An Appropriate Assessment For Emissions to Air' (EA,2014):

Dry deposition flux (µg/m2/s) = ground-level concentration (µg/m3) x deposition velocity (m/s)

Deposition velocities are provided in both the TII (TII, 2022a) and AGTAG06 (EA, 2014) guidance for NO2 for grassland and forestry:

Grassland and similar habitats: 1 µg/m3 of NO2= 0.14 kg N/ha/yr

Forest and similar habitats: 1 µg/m3 of NO2 = 0.29 kg N/ha/yr

Once the dry deposition flux (µg/m2/s) is calculated, it must then be converted to nitrogen deposition and nitrogen equivalent acidification flux (keq/ha/year), where keq is a unit of equivalence (a measure of how acidifying the chemical species can be) for comparison with critical loads.

In order to convert the dry deposition flux from units of (µg/m2/s) to units of nitrogen deposition (kg/ha/year) the dry deposition flux is multiplied by the conversion factors shown in Table 13-2, and provided in AGTAG06 (EA, 2014). For NO2 this factor is 6.84.

Acid (N) deposition (keq/ha/yr) = Dry deposition flux (µg/m2/s) x Acid deposition conversion factor

The TII guidance (TII, 2022a) simplify these two rates to an acid deposition conversion factor, which applicable to all habitats of 1 kg N/ha/yr = 0.071429 keq N/ha/yr.

Nitrogen deposition and acid deposition is calculated in this manner for both NO_2, and these are then summed for total nitrogen deposition and acid deposition at each sensitive designated habitat.

Table 13-2 Deposition, Nitrogen and Acid Deposition Fluxes for NO_2

Chemical Species	Habitat Type	Recommended Deposition Velocity (m/s)	Dry Deposition Flux (µg/m2/s) Conversion Factor to N Deposition Flux (kg/ha/yr)	Dry Deposition Flux (µg/m2/s) Conversion Factor to Acid Deposition Flux (keq/ha/yr)
NO_2(as N)	Grassland	0.0014	95.9	6.84

For the purposes of this assessment, the TII REM Tool and Traffic data from **Chapter 12 Traffic and Transportation** was used to calculate N deposition and Acid Deposition.

The Air Pollution Information System Tool (APIS, 2023) was used to find critical loads so that significance of the above parameters deposition could be assessed.

13.2.3.2 Climate

GHG Emissions

Ireland has annual GHG targets which are set at an EU level and need to be compiled with in order to reduce the effect of climate change. Effects to climate as a result of GHG emissions are assessed against the targets set out by the EU under Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation(EU) No. 525/2013, which has set a target of 30% reduction in non-ETS sector GHG emissions by 2030 relative to 2005 levels.

As per the EU guidance document Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (European Commission, 2013) the climate baseline is first established with reference to EPA data on annual GHG emissions (see **Section 13.3.2.6**). The effect of the proposed development on climate is determined in relation to this baseline. Road traffic associated with the proposed Project will emit certain volumes of carbon dioxide (CO_2) and, to a lesser degree, methane (CH_4), nitrous oxide (N_2O) and, potentially hydrocarbons, all of which have global warming potential.

The UK Highways Agency document, LA 114 Climate (UK Highways Agency 2019b) sets out the following scoping criteria which are used to determine whether a detailed climate assessment is required for a proposed project during the operational stage:

- A change of more than 10% in AADT;
- A change of more than 10% to the number of heavy-duty vehicles; or
- A change in daily average speed of more than 20km/hr

The access road to Reenroe Beach will experience an increase of more than 10% or more in the AADT, therefore this link has been included in the detailed climate assessment.

The effect of the traffic related emissions during operation has been calculated through the use of the REM tool (TII, 2022b) which includes detailed fleet predictions for age, fuel technology, engine size and weight based on available national forecasts. The output is provided in terms of CO_2eq for the base year 2026 and years 2031 and 2041. Both the Do Nothing and Do Something Scenarios are quantified in order to determine the degree of change in emissions as a result of the proposed development. Traffic data was available from **Chapter 12** of this **EIAR**.

The EU guidance (2013) also states that indirect GHG emissions as a result of a proposed development must be considered, this includes emissions associated with energy usage. In addition to the EU guidance, the Institute of Environmental Management and Assessment (IEMA) guidance note on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2022) states that "the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050". Mitigation has taken a leading role within the guidance compared the previous edition published in 2017. Early stakeholder engagement is key and therefore mitigation should be considered from the outset of the project and continue throughout the project's lifetime in order to maximise GHG emissions savings.

Climate Change Effects on the Proposed Development

Effects of climate change on the proposed development must also be considered. The following items have been factored into the assessment:

- Flood risk due to increased precipitation, and intense periods of rainfall.
- Rising Sea Levels
- Coastal Erosion
- Increased Temperatures
- Ice or snow
- Major Storm Damage

The assessment of the proposed developments resilience to flood risk is based upon the location of the proposed development relevant to flood areas and the level at which the finished floor level of the proposed development is in relation to predicted flood levels and historic high flood elevations. MWP has carried out a Flood Risk Assessment and details are summarised in Section 13.4.2.2.

The parameters in the flood risk assessment includes future predictions of rising sea levels which was used to assess the projects adaptability to rising sea levels also and coastal erosion.

There is no set criteria for climate adaptation, therefore the level of effect from increased temperatures, ice/snow and major storm events was assessed by research to predict future climate effects in Ireland. The level of climate adaptation of the proposed development to each climate change effect was than assessed, based on the characteristics of the proposed development infrastructure.

13.3 Baseline Environment

13.3.1 Air Quality Baseline

13.3.1.1 Wind Data

A key factor is assessing temporal and spatial variations in air quality are the prevailing wind conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutants under the same source strength (i.e traffic levels) (WHO, 2021). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex, due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Valentia Weather Station, which is located approximately 10km north of the proposed development. Valentia Weather Station met data has been examined to identify the prevailing wind direction (see Figure 13-1). The predominant wind direction is from south-westerly direction, followed by wind from west and south-west with a mean wind speed of 4.8 m/s over the 30-year period of 1990-2020 (Met Éireann, 2024).

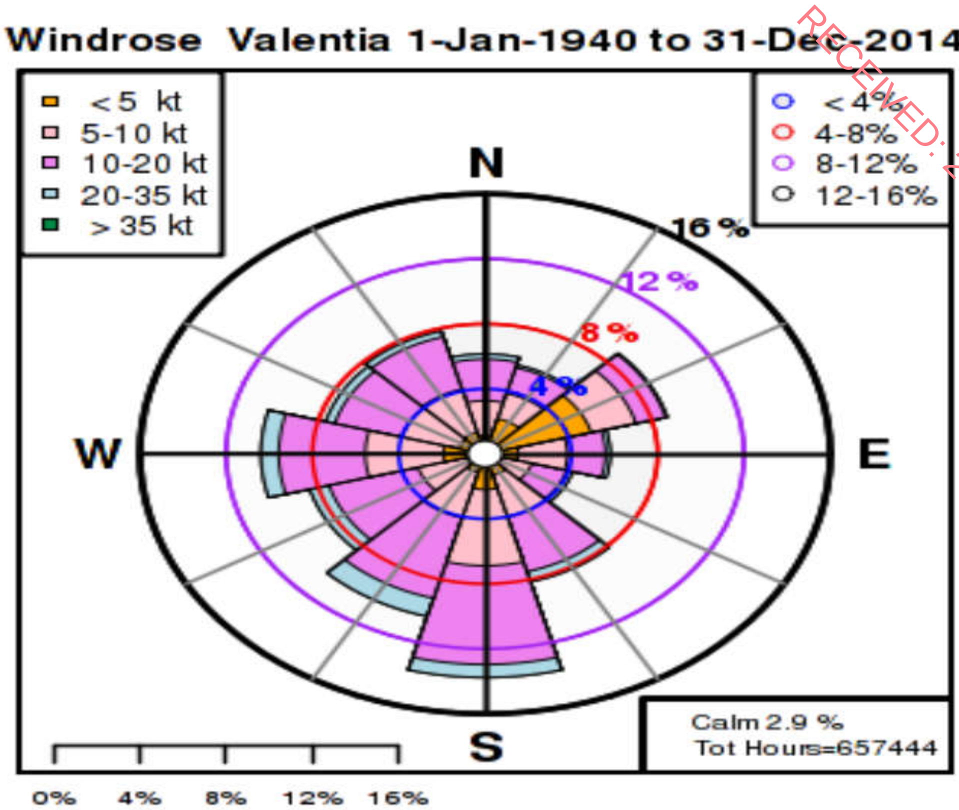

Figure 13-1 Valentia Windrose

13.3.1.2 Sensitive Receptors

The proposed development is located on the Iveragh Peninsula, between the coastal settlements of Waterville and Ballinskelligs, on the coast of Ballinskelligs Bay. The site is part of the busy Wild Atlantic Way and ring of Skellig tourist routes. Reenroe Beach is one of the largest sandy beaches on the Iveragh peninsula and is a noted stop along these routes.

The proposed development site is just south of the R567 and Reenroe beach is located to the south. The Dungeagan to Reenroe Walking Loop and the Emlagh Loop Ballinskelligs pass through the site. There are agricultural fields surrounding the site to the north, east and west.

A detailed description of the proposal is presented in Chapter 2 of the EIAR.

The most significant potential air quality effects from the proposed development will occur from dust emissions during phase one of the construction phase of the proposed development. The development site will undergo site clearance and preparation works, earth moving, construction of foundations and site infrastructure and subsequent construction of the units that make up the development.

Phase 1 of the proposed development will be the longest phase construction and therefore represents the period with longest and largest dust emission magnitude potential. Phase 1 will be for be carried out over an approximate 18 months and will continue through on peak holiday period. Phase 2 to Phase 4 of the construction will have stoppages in July and August.

The principal local receptors that may be effected by the development are existing dwellings to the north, west, south and east of the proposed development site. Many of these dwellings are holiday homes which are vacant for most of the year, refer to Figure 13-3.

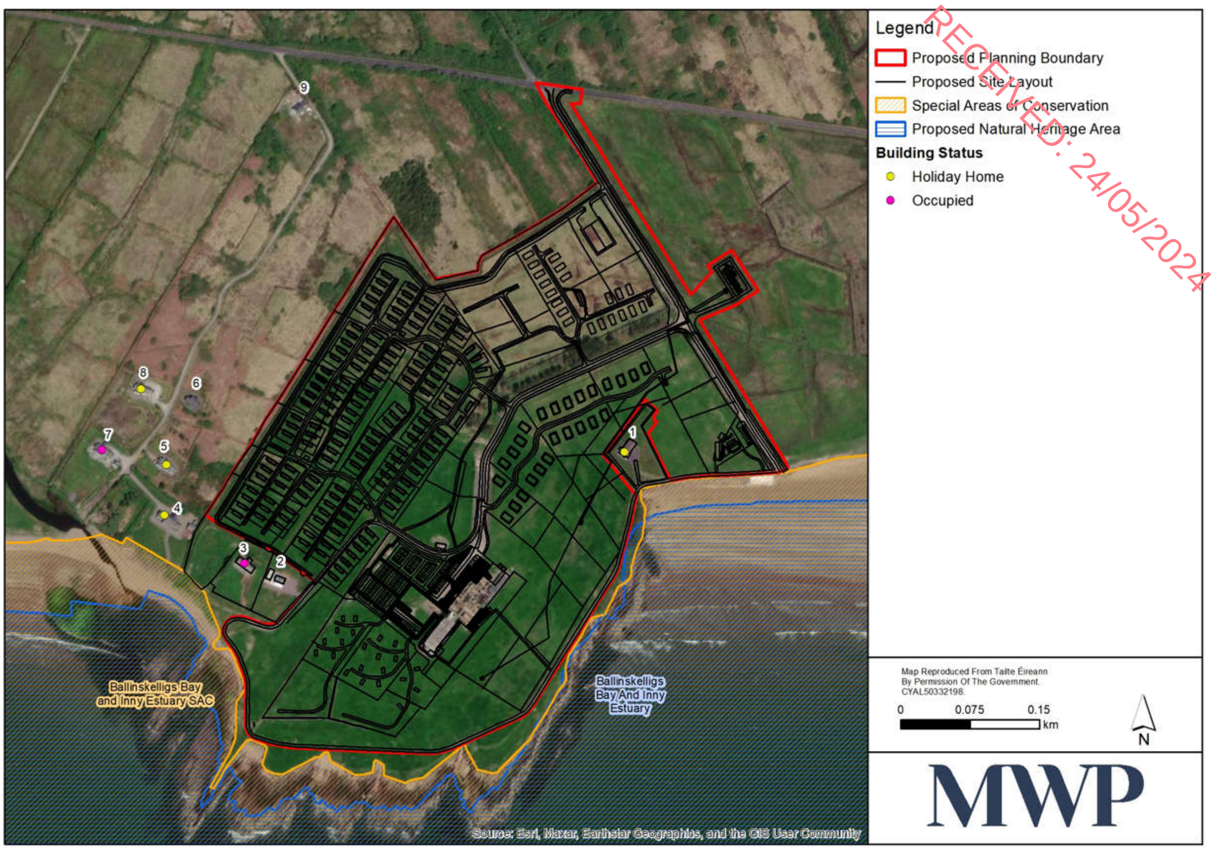

Figure 13-2 Location map of nearest dust sensitive receptors to the proposed development boundary

The closest Natura 2000 sites are Ballinskelligs Bay and Inny Esturary SAC and Ballinskelligs Bay and Inny Estuary pNHA and Kenmare River SAC.

13.3.1.3 Sensitivity of the Receiving Environment

In line with the UK Institute of Air Quality Management (IAQM) guidance document 'Guidance on the Assessment of Dust from Demolition and Construction' (2024) prior to assessing the effect of dust from a proposed development, the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas are taken into consideration. For the purposes of this assessment, high sensitive receptors are regarded as residential properties where people are likely to spend the majority of their time. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

In terms of receptor sensitivity to dust soiling, there are sensitive receptors in proximity to the EIAR boundary including currently occupied residential properties. There are 3 receptors within 20m of the boundary and therefore, based on the IAQM criteria outlined in Table 13-3, the worst-case sensitivity of the area to dust soiling is considered medium.

Table 13-3 Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<250
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Source: IAQM Guidance on the assessment of dust from demolition and construction (2024, V2.2)

In addition to sensitivity to dust soiling, the IAQM guidelines also outlines the assessment criteria for determining the sensitivity of the area to human health effects. The criteria takes into consideration the current annual mean PM_{10} concentration, receptor sensitivity based on type (residential receptors are classed as high sensitivity) and the number of receptors affected within various distance bands from the construction works.

A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is 14.3 µg/m^3. There are three receptors within 20m of the EIAR boundary. Based on the IAQM criteria outlined in **Table 13-4**, the worst-case sensitivity of the area to human health is considered **low**.

Table 13-4 Sensitivity of the Area to Human Health Effects

Receptor Sensitivity	Annual Mean PM_{10} concentration	Number of Receptors	Distance from the Source (m)			
			<20	<50	<100	<250
High	>32µg/m^3	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32µg/m^3	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28µg/m^3	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24µg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32µg/m^3	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28-32µg/m^3	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low

Source: IAQM Guidance on the assessment of dust from demolition and construction (2024, V2.2)

The IAQM guidelines also outline the assessment criteria for determining sensitivity of the area to dust-related ecological effects. Dust emissions can coat vegetation leading to a reduction in the photosynthesising ability of the plant, as well as other effects. The guidance states that dust effects to vegetation can occur up to 50m from the boundary of a site, 50m of route used by construction vehicles and up to 250m from site entrance.

Works will occur in close proximity to the Ballinskelligs Bay and Inny Esturary SAC and Ballinskelligs Bay and Inny Estuary pNHA. The IAQM guidelines specify that a location with an international or national designation be described as a **high** sensitive receptor.

With regard to **Table 13-5**, the sensitivity of the area to ecological effects can be considered **high** given that the Ballinskelligs Bay and Inny Esturary SAC and Ballinskelligs Bay and Inny Estuary pNHA are within 20m from the proposed development boundary.

Table 13-5 Sensitivity of the Area to Ecological Effects

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Source: IAQM Guidance on the assessment of dust from demolition and construction (2024, V2.2)

13.3.1.4 Air Quality Data

Air quality monitoring programs have been undertaken in recent years by the EPA. The most recent annual report on air quality in Ireland is "Air Quality in Ireland 2022" (EPA, 2022a). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments.

As part of the implementation of the Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022) four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2022b). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000 is defined as Zone D.

In terms of air monitoring and assessment, the proposed development site is within Zone D (EPA, 2022a). The long term data has been used to determine the background concentrations accounts for all non-traffic derived emissions (e.g.) natural sources, industry , home heating etc.).

Long term monitoring results for Zone D, unless otherwise stated, for the following pollutants are shown in **Table 13-6**:

- Oxides of Nitrogen (NO2)
- Particulate Matter (PM10)
- Particulate Matter (PM2.5)

MWP

Table 13-6 EPA and reference site specific air quality data

Parameter - Zone D unless otherwise stated for NO2, SO2, PM10 & PM2.5, O3 Benzene & CO	Annual average Year 2019 (µg/m3)	Annual average Year 2020 (µg/m3)	Annual average Year 2021 (µg/m3)	Annual average Year 2022 (µg/m3)	Notes
Oxides of nitrogen (NO_2)- Zone D	5.7	7.6	7.5	7.4	EPA Baseline reports- Air quality in Ireland 2019, 2020, 2021,2022
Sulphur dioxide (SO_2)- Zone D	3.1	4.2	4.2	5	EPA Baseline reports- Air quality in Ireland 2019, 2020, 2021,2 2022
Nitrogen Oxides (NO_x) Zone D	7.8	15.9	14.2	14	EPA Baseline reports- Air quality in Ireland 2019, 2020, 2021, 2022
Particulate matter PM_{10} - Zone D	14.3	11.2	11.9	12.7	EPA Baseline reports- Air quality in Ireland 2019, 2020, 2021, 2022
Particulate matter $PM_{2.5}$- Zone D	9.3	7.8	8.7	8.4	EPA Baseline reports- Air quality in Ireland 2019, 2020, 2021, 2022
Benzene- Zone D	.12	.04	.18	.21	EPA Baseline reports- Air quality in Ireland 2019, 2020, 2021, 2022
Carbon monoxide (CO)- Zone C	-	0.4	0.3	0.8	EPA Baseline reports- Air quality in Ireland 2019, 2020, 2021, 2022
Ozone (O3)- Zone D	64.1	61.6	60.2	61.7	EPA Baseline reports- Air quality in Ireland 2019, 2020, 2021,2022

Continuous monitoring of NO_2 carried out across Zone D sites indicates an average annual mean concentrations ranging from 5.7 to 7.6 µg/m^3 in 2019, 2020, 2021 and 2022 (see **Table 13.6**) (EPA 2019, 2020, 2021,2022). Sufficient data is available for all stations to observe trends over the periods 2019 to 2022. An analysis of the data suggests upper max average concentrations of no more than 7.6 µg/m^3. Based on these results, a conservative estimate of the background annual average of NO_2 concentration in the region of the proposed development is 7.6 µg/m^3.

Continuous monitoring of SO_2 carried out across Zone D sites indicates average annual mean concentrations ranging from 3.1 to 5 µg/m^3 in 2019, 2020, 2021 and 2022(see **Table 13.6**) (EPA, 2019, 2020, 2021, 2022). Sufficient data is available for all stations to observe tends over the periods 2019 to 2022. An analysis of the data suggests upper max average concentrations of no more than 5 µg/m^3. Based on these results, a conservative estimate of the background annual average SO_2 concentration in the region of the Proposed Development is 5 µg/m^3.

Continuous monitoring of NO_x carried out across Zone D sites indicates average annual mean concentrations ranging from 7.8 to 15.9 µg/m^3 in 2019, 2020, 2021 and 2022(see **Table 13.6**) (EPA, 2019, 2020, 2021,2022). Sufficient data is available for all stations to observe tends over the periods 2019 to 2022. An analysis of the data suggests upper max average concentrations of no more than 15.9 µg/m^3. Based on these results, a conservative estimate of the background annual average NO_x concentration in the region of the Proposed Development is 15.9 µg/m^3.

Continuous PM_{10} monitoring carried out across Zone D sites indicates average annual mean concentrations ranging from 11.2 and 14.3 µg/m^3 in 2019, 2020, 2021, 2022 (see **Table 13.6**) (EPA, 2019, 2020, 2021,2022). Sufficient data is available for all stations to observe tends over the periods 2019 to 2022. An analysis of the data suggests upper max average concentrations of no more than 14.3 µg/m^3. Based on these results, a conservative estimate of the background annual average $PM_{2.5}$ concentration in the region of the Proposed Development is 14.3 µg/m^3.

Continuous $PM_{2.5}$ monitoring carried out across Zone D sites indicates average annual mean concentrations ranging from 7.8 and 9.3 µg/m^3 in 2020, 2021 and 2022(see **Table 13.6**) (EPA, 2019, 2020, 2021,2022). Sufficient data is available for all stations to observe tends over the periods 2019 to 2022. An analysis of the data suggests upper max average concentrations of no more than 9.3 µg/m^3. Based on these results, a conservative estimate of the background annual average $PM_{2.5}$ concentration in the region of the Proposed Development is 9.3 µg/m^3.

Continuous Carbon monoxide monitoring carried out across Zone D sites indicates an average annual mean concentrations ranging from 300 to 800 µg/m^3 in 2020, 2021 and 2022 (see **Table 13.6**). There was no Carbon monoxide monitoring data available for 2019 for Zone D. An analysis of the data suggests upper max average concentrations of no more than 800 µg/m^3. Based on these results, a conservative estimate of the background annual average CO concentration in the region of the Proposed Development is 800 µg/m^3.

Continuous Benzene monitoring data for the Zone D location of Shannon Town is not available since 2012. As an alternative, data from the Zone C location of Kilkenny for the period 2019 – 2022 indicates average annual mean concentrations ranging from 0.04 to 0.21 µg/m3, which is significantly lower than the 5 µg/m3 limit value. Based on these results, a conservative estimate of the background annual average Benzene concentration in the region of the Proposed Development is 0.21 µg/m3.

Continuous monitoring for Ozone carried out across Zone D sites indicates average annual mean concentrations ranging from 60.2 and 64.1 µg/m^3 in 2019, 2020, 2021 and 2022 (see **Table 13.6**) (EPA, 2019, 2020, 2021,2022). An analysis of the data suggests upper max average concentrations of no more than 64.1 µg/m^3. Based on these results, a conservative estimate of the background annual average O_3 concentration in the region of the Proposed

13.3.2 Climate Baseline

13.3.2.1 Global Climate

Climate change is considered in a global rather than local context. Every year, the World Meteorological Organisation (WMO) issues a Report on the State of the Global Climate. It is based on data provided by National Meteorological and Hydrological Services and other national and international organisations. Some of the key messages in the latest available annual report, 'Provisional State of the Global Climate 2023' are as follows:

- Observed concentrations of the three main greenhouse gases – carbon dioxide, methane, and nitrous oxide – reached record high levels in 2022, the latest year for which consolidated global values are available. Real-time data from specific locations show that levels of the three greenhouse gases continued to increase in 2023.
- The global mean near-surface temperature in 2023 (to October) was around 1.40 (± 0.12) °C above the 1850–1900 average. Based on the data to October, it is virtually certain that 2023 will be the warmest year in the 174-year observational record, surpassing the previous joint warmest years, 2016 at 1.29 (± 0.12) °C above the 1850–1900 average and 2020 at 1.27 (±0.13) °C.
- Record monthly global temperatures have been observed for the ocean – from April through to October – and, starting slightly later, the land – from July through to October.
- June, July, August, September and October 2023 each surpassed the previous record for the respective month by a wide margin in all datasets used by WMO for the climate report. July is typically the warmest month of the year globally, and thus July 2023 became the all-time warmest month on record.
- Global average sea-surface temperatures (SSTs) were at a record observed high for the time of year, starting in the late Northern Hemisphere spring. April through September (the latest month for which we have data) were all at a record warm high, and the records for July, August and September were each broken by a large margin (around 0.21 to 0.27 °C). Exceptional warmth was recorded in the eastern North Atlantic, the Gulf of Mexico and the Caribbean, and large areas of the Southern Ocean, with widespread marine heatwaves.
- Ocean heat content reached its highest level in 2022, the latest available full year of data in the 65-year observational record.
- It is expected that warming will continue – a change which is irreversible on centennial to millennial timescales. All data sets agree that ocean warming rates show a particularly strong increase in the past two decades.
- In 2023, global mean sea level reached a record high in the satellite record (since 1993), reflecting continued ocean warming as well as the melting of glaciers and ice sheets. The rate of global mean sea level rise in the past ten years (2013–2022) is more than twice the rate of sea level rise in the first decade of the satellite record (1993–2002).
- Antarctic sea-ice extent reached an absolute record low for the satellite era (1979 to present) in February. Ice extent was at a record low for the time of year from June onwards. The annual maximum in September was 16.96 million km2, roughly 1.5 million km2 below the 1991–2020 average and 1 million km2 below the previous record low maximum, from 1986.
- Arctic sea-ice extent remained well below normal, with the annual maximum and minimum sea ice extents being the fifth and sixth lowest on record respectively.
- Glaciers in western North America and the European Alps experienced an extreme melt season. In Switzerland, glaciers have lost around 10% of their remaining volume in the past two years.
- Extreme weather and climate events had major effects on all inhabited continents. These included major floods, tropical cyclones, extreme heat and drought, and associated wildfires.
- Flooding associated with extreme rainfall from Mediterranean Cyclone Daniel affected Greece, Bulgaria, Turkey, and Libya, with particularly heavy loss of life in Libya in September.

- Tropical Cyclone Freddy in February and March was one of the world's longest-lived tropical cyclones with major effects on Madagascar, Mozambique and Malawi. Tropical Cyclone Mocha, in May, was one of the most intense cyclones ever observed in the Bay of Bengal.
- Extreme heat affected many parts of the world. Some of the most significant were in southern Europe and North Africa, especially in the second half of July where severe and exceptionally persistent heat occurred. Temperatures in Italy reached 48.2 °C, and record-high temperatures were reported in Tunis (Tunisia) 49.0 °C, Agadir (Morocco) 50.4 °C and Algiers (Algeria) 49.2 °C.
- Canada's wildfire season was well beyond any previously recorded. The total area burned nationally as of October 15th was 18.5 million hectares, more than six times the 10-year average (2013–2022). The fires also led to severe smoke pollution, particularly in the heavily populated areas of eastern Canada and the north-eastern United States. The deadliest single wildfire of the year was in Hawaii, with at least 99 deaths reported – the deadliest wildfire in the USA for more than 100 years.
- Five consecutive seasons of drought in the Greater Horn of Africa was followed by floods, triggering even more displacements. The drought reduced the capacity of the soil to absorb water, which increased flood risk when the Gu rains arrived in April and May.
- Long-term drought intensified in many parts of Central America and South America. In northern Argentina and Uruguay, rainfall from January to August was 20 to 50% below average, leading to crop losses and low water storage levels.

13.3.2.2 IPPC: AR Synthesis Report – Climate Change 2023

The Synthesis Report (SYR) of the IPCC Sixth Assessment Report (AR6) summarises the state of knowledge of climate change, its widespread effects and risks, and climate change mitigation and adaption. It integrates the main findings of the Sixth Assessment Report (AR6) based on contributions from the three Working Groups[1], and the three Special Reports[2].

The report recognises the interdependence of climate, ecosystems and biodiversity, and human societies. It recognises the value of diverse forms of knowledge and the close linkages between climate change adaption, mitigation, ecosystem health, human well-being and sustainable development. The report reflects the increasing diversity of actors involved in climate action.

[1] The three Working Group contributions to AR6 are: AR6 Climate Change 2021: The Physical Science Basis; AR6 Climate Change 2022: Impacts, Adaption and Vulnerability; and AR6 Climate Change 2022: Mitigation of Climate Change. Their assessments cover scientific literature accepted for publication respectively by 31 January 2021, 1 September 2021 and 11 October 2021.

[2] . The three Special Reports are: Global Warming of 1.5º (2018): an IPPC Special Report on the impacts of global warming of 1.5ºC above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty; Climate Change and Land (2019): an IPPC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems; and The Ocean and Cryosphere in a Changing Climate (2019). The Special Reports cover scientific literature accepted for publication respectively by 15 May 2018, 7 April 2019, and 15 May 2019.

Some key findings[3] of the report are as follows and are categorised next, under 'Current Status and Trends, Future Climate Change, Risks and Long-Term Responses, Responses in the Near Term'. Each finding is grounded in an evaluation of underlying evidence and agreement.

A. Current Status and Trends

Observed Warning and its Causes

- A.1 Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850-1900 temperatures in 2011-2020. Global greenhouse gas emissions have continued to increase, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption, and production across regions, between and within countries, and among individuals (*high confidence*).

Observed Changes and Effects

- A.2 Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts and related losses and damages to nature and people (*high confidence*). Vulnerable communities who have historically contributed the least to current climate change are disproportionately affected (*high confidence*).

Current Progress in Adaption and Gaps and Challenges

- A.3 Adaption planning and implementation has progressed across all sectors and regions, with documented benefits and varying effectiveness. Despite progress, adaption gaps exist, and will continue to grow at current rates of implementation. Hard and soft limits to adaption have been reached in some ecosystems and regions. Maladaptation is happening in some sectors and regions. Current global financial flows for adaption are insufficient for, and constrain implementation of adaption options, especially in developing countries (*high confidence*).

Current Progress in Adaption and Gaps and Challenges

- A.4 Policies and laws addressing mitigation have consistently expanded since AR5. Global GHG emissions in 2030 implied by nationally determined contributions (NDCs) announced by October 2021 make it likely that warming will exceed 1.5°C during the 21st century and make it harder to limit warming below 2°C. There are gaps between projected emissions from implemented policies and those from NDCs. Finance flows fall short of the levels needed to meet climate goals across all sectors and regions (*high confidence*).

[3] The IPCC calibrated language uses five qualifiers to express a level of confidence: very low, low, medium, high and very high, and typeset in italics, for example *medium confidence*. The following terms are used to indicate the assessed likelihood of an outcome or a result: virtually certain 99-100% probability, very likely 90-100%, likely 66-100%, more likely than not >50-100%, about as likely as not 33-66%, unlikely 0-33%, very unlikely 0-10%, exceptionally unlikely 0-1%. Additional terms (extremely likely 95-100%; more likely than not >50-100%; and extremely unlikely 0-5%) are also used when appropriate. Assessed likelihood is typeset in italics, e.g., *very likely*. This is consistent with AR5 and the other AR6 Reports.

B. Future Climate Change, Risks and Long-Term Responses

Future Climate Change

- B.1 Continued greenhouse gas emissions will lead to increasing global warming, with the best estimate of reaching 1.5ºC in the near term in considered scenarios and modelled pathways. Every increment of global warming will intensify multiple and concurrent hazards (*high confidence*). Deep, rapid, and sustained reductions in greenhouse gas emissions would lead to a discernible slowdown in global warming within two decades, and also to discernible changes in atmospheric composition within a few years (*high confidence*).

Climate Change Impacts and Climate-Related Risks

- B.2 For any given warning level, many climate-related risks are higher than assessed in AR5, and project long-term impacts are up to multiple times higher than currently observed (*high confidence*). Risks and projected adverse impacts, and related losses and damages from climate change escalate with every increment of global warming (*very high confidence*). Climatic and non-climatic risks will increasingly interact, creating compound and cascading risks that are more complex and difficult to manage (*high confidence*).

Likelihood and Risks of Unavoidable, Irreversible or Abrupt Changes

- B.3 Some future changes are unavoidable and/or irreversible but can be limited by deep, rapid and sustained global greenhouse emissions reduction. The likelihood of abrupt and/or irreversible changes increases with higher global warming levels. Similarly, the probability of low-likelihood outcomes associated with potentially very large adverse impacts increases with higher global warming levels (*high confidence*).

Adaptation Options and their Limits in a Warmer World

- B.4 Adaption options that are feasible and effective today will become constrained and less effective with increasing global warming. With increasing global warming, losses and damages will increase and additional human and natural systems will reach adaption limits. Maladaptation can be avoided by flexible, multi-sectoral, inclusive, long-term planning and implementation of adaptation actions, with co-benefits to many sectors and systems (*high confidence*).

Carbon Budgets and Net Zero Emissions

- B.5 Limiting human-caused global warming requires net zero CO_2 emissions. Cumulative carbon emissions until the time of reaching net-zero CO_2 emissions and the level of greenhouse gas emission reductions this decade, largely determine whether warming can be limited to 1.5ºC or 2ºC (*high confidence*). Projected CO_2 emissions from existing fossil fuel infrastructure without additional abatement would exceed the remaining carbon budget for 1.5ºC (50%) (*high confidence*).

Mitigation Pathways

- B.6 All global modelled pathways that limit warming to 1.5ºC (>50%) with no or limited overshoot, and those that limit warming to 2ºC (>67%), involve rapid and deep and, in most cases, immediate greenhouse emissions reductions in all sectors this decade. Global net zero CO_2 emissions are reached for these pathway categories, in the early 2050s and around the early 2070s, respectively (*high confidence*).

Overshoot: Exceeding a Warming Level and Returning

- B.7 If warming exceeds a specified level such as 1.5°C, it could gradually be reduced again by achieving and sustaining net adverse global CO_2 emissions. This would require additional deployment of carbon dioxide removal, compared to pathways without overshoot, leading to greater feasibility and sustainability concerns. Overshoot entails adverse impacts, some irreversible, and additional risks for human and natural systems, all growing with the magnitude and duration of overshoot (*high confidence*).

C. Responses in the Near Term

Urgency of Near-Term Integrated Climate Action

- C.1 Climate change is a threat to human well-being and planetary health (*very high confidence*). There is a rapidly closing window of opportunity to secure a liveable and sustainable future for all (*very high confidence*). Climate resilient development integrates adaptation and mitigation to advance sustainable development for all and is enabled by increased international cooperation, including improved access to adequate financial resources, particularly for vulnerable regions, sectors and groups, and inclusive governance and coordinated policies (*high confidence*). The choices and actions implemented in this decade will have impacts now and for thousands of years (*high confidence*).

The Benefits of Near-Term Action

- C.2 Deep, rapid and sustained mitigation and accelerated implementation of adaption actions in this decade would reduce projected losses and damages for humans and ecosystems (*very high confidence*), and deliver many co-benefits, especially for air quality and health (*high confidence*). Delayed mitigation and adaptation action would lock-in high emissions infrastructure, raise risks of stranded assets and cost-escalation, reduce feasibility, and increase losses and damages (*high confidence*). Near-term actions involve high up-front investments and potentially disruptive changes that can be lessened by a range of enabling policies (*high confidence).*

Mitigation and Adaption Options across Systems

- C.3 Rapid and far-reaching transitions across all sectors and systems are necessary to achieve deep and sustained emissions reductions and secure a liveable and sustainable future for all. These system transitions involve a significant upscaling of a wide portfolio of mitigation and adaption options. Feasible, effective, and low-cost options for mitigation and adaptation are already available, with differences across systems and regions (*high confidence*).
- C.4 Accelerated and equitable action in mitigating and adapting to climate change impacts is critical to sustainable development. Mitigation and adaptation actions have more synergies than trade-offs with Sustainable Development Goals. Synergies and trade-offs depend on context and scale of implementation (*high confidence*).
- C.5 Prioritising equity, climate justice, social justice, inclusion and just transition processes can enable adaptation and ambitious mitigation actions and climate resilient development. Adaptation outcomes are enhanced by increased support to regions and people with the highest vulnerability to climatic hazards. Integrating climate adaptation into social protection programs improves resilience. Many options are available for reducing emission-intensive consumption, including through behavioural and lifestyle changes, with co-benefits for social well-being (*high confidence*).
- C.6 Effective climate action is enabled by political commitment, well-aligned multilevel governance, institutional frameworks, laws, policies and strategies and enhanced access to finance and technology. Clear goals, coordination across multiple policy domains, and inclusive governance processes facilitate effective climate action. Regulatory and economic instruments can support deep emissions reductions

and climate resilience if scaled up and applied widely. Climate resilient development, benefits from drawing on diverse knowledge (*high confidence*).

- C.7 Finance, technology, and international cooperation are critical enablers for accelerated climate action. If climate goals are to be achieved, both adaptation and mitigation financing would need to increase many-fold. There is sufficient global capital to close the global investment gaps but there are barriers to redirect capital to climate action. Enhancing technology innovation systems is key to accelerate the widespread adoption of technologies and practices. Enhancing international cooperation is possible through multiple channels.

13.3.2.3 US National Oceanic and Atmospheric Assoc. (NOAA) Monthly Report March 2024

Key highlights from the latest available Global Climate Report (March 2024), published by the US National Oceanic and Atmospheric Association are presented below:

- March 2024 was the warmest March on record for the globe in NOAA's 175-year record. The March global surface temperature was 1.35°C (2.43°F) above the 20th-century average of 12.7°C (54.9°F). This is 0.01°C (°F) warmer than the previous March record set in 2016, and the tenth consecutive month of record-high global temperatures. March 2024 marked the 48th consecutive March with global temperatures, at least nominally, above the 20th-century average.
- Global land-only March temperatures ranked fourth warmest on record at 2.09°C (3.76°F) above average. Ocean-only temperatures ranked warmest on record for March at 1.01°C (1.82°F) above average. This is 0.18°C (0.32°F) warmer than the second warmest March of 2016, and the 12th-consecutive monthly record high. These temperatures occurred as the current El Niño episode nears its end. El Niño conditions that emerged in June 2023 weakened further in March, and according to NOAA's Climate Prediction Center, a transition from El Niño to ENSO–neutral is likely by April-June 2024 (85% chance), with odds of La Niña developing by June–August 2024 (60% chance).
- In the Northern Hemisphere, March 2024 ranked second warmest on record at 1.68°C (3.02°F) above average, cooler than the March 2016 record of 1.82°C (3.28°F). The Northern Hemisphere land temperature was seventh warmest while the ocean temperature ranked warmest on record for the month.
- The Southern Hemisphere experienced its warmest March on record at 1.01°C (1.82°F) above average. Both the Southern Hemisphere land temperature and ocean temperature also ranked warmest on record for March.
- Above-average March precipitation occurred in areas that included much of western Europe, much of central and eastern Russia, areas of central China, large parts of Japan, and much of central and western Australia. Precipitation also was above average along much of the U.S. East Coast and Deep South, the western contigous U.S. and western Alaska. In South America wetter-than-average conditions were notable in coastal Brazil and northeastern Argentina. Conversely, drier-than-average conditions were widespread in Mexico, Central America, many northern areas of South America, and the Hawaiian Islands. March precipitation also was below-average in much of central and eastern Europe, southern Mongolia, northern and southeastern China, southern and western India, large parts of North Africa and West Africa, as well as much of eastern Australia and New Zealand.

13.3.2.4 United in Science Report 2023

The United in Science 2023 report, is compiled by the World Meteorological Organisation (WMO), on behalf of the United Nations Secretary-General to bring together the latest climate science related updates from groups of key global partner organisations including WMO, Global Carbon Project (GCP), Intergovernmental Panel on Climate Change (IPCC), United Nations Environment Programme (UNEP), World Health Organization (WHO), the Met Office (United Kingdom, UK), the jointly sponsored WMO/Intergovernmental Oceanographic Commission (IOC) of UNESCO/International Science Council (ISC), and World Climate Research Programme (WCRP). It presents the very latest scientific data and findings related to climate change to inform global policy and action. Key messages in the report include:

State of the Science

- Total carbon dioxide (CO2) emissions from fossil fuels and land use change remained high in 2022 and the first half of 2023. Fossil fuel CO2 emissions increased 1% globally in 2022 compared to 2021, and global average concentrations continued rising through 2022 and the first half of 2023.
- The years from 2015 to 2022 were the eight warmest on record, and the chance of at least one year exceeding the warmest year on record in the next five years is 98%.
- It is estimated that current mitigation policies will lead to global warming of around 2.8°C over this century compared to pre-industrial levels. Immediate and unprecedented reductions in greenhouse gas (GHG) emissions are needed to achieve the goals of the Paris Agreement.

SDG 2 Zero Hunger

Projections estimate that nearly 670 million people may still face hunger in 2030, in part due to more frequent and intense extreme weather events that are disrupting each pillar of food security (availability, access, utilization and stability).

- Weather-, climate- and water-related sciences underpin services that enable farmers to make climate-informed decisions that enhance food and nutrition security.
- To effectively support the achievement of SDG 2, global investments are needed in weather-, climate- and water-related sciences and services along agrifood value chains.

SDG 3 Good Health and Well-being

- Transdisciplinary research is fundamental to analysing, monitoring and addressing climate-sensitive health risks and climate impacts on the health sector.
- Climate change and extreme events are projected to significantly increase ill health and premature deaths, as well as population exposure to heatwaves and heat-related morbidity and mortality.
- Scaling up investments in climate-resilient and low-carbon health systems, and progress towards universal health coverage are critical for the achievement of SDG 3.

SDG 6 Clean Water and Sanitation

Climate change is exacerbating water-related hazards and altering the Earth's water cycle, making it increasingly difficult to achieve SDG 6.

- More than 60% of countries face challenges due to inadequate and declining hydrological monitoring capabilities.
- More scientific collaboration, financial investments and data and information exchange will be key for policymakers to make informed decisions to accelerate implementation of SDG 6.

SDG 7 Affordable and Clean Energy

- Extreme weather events and anthropogenic climate change threaten the achievement of SDG 7 by changing energy supply capability and demand profiles, making the clean energy transition more unpredictable and potentially more expensive.
- More timely and accurate weather-, climate- and water-related data, science and services will improve energy planning and operations.
- Challenges remain in uneven and/or low data quality and limited availability and affordability of data and services.

SDG 11 Sustainable Cities and Communities

Cities are responsible for a high proportion of global greenhouse gas (GHG) emissions and are highly vulnerable to the impacts of climate change and extreme weather events, which threaten the achievement of SDG 11.

- Integrated urban weather, climate, water and environmental services, grounded in best-available science, are helping cities to achieve SDG 11.
- Observations, high-resolution forecasting models and multi-hazard early warning systems are the fundamental basis for integrated urban services.

SDG 13 Climate Action

- The accumulation of heat in the climate system resulting from human emissions of greenhouse gases (GHGs) has caused widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere, which threaten to reverse progress towards achieving all the SDGs.
- Weather-, climate- and water-related science underpin ambitious climate action and the mobilization of climate finance, particularly in lower-income countries.
- Stakeholder engagement, through means such as citizen science, provides an opportunity to strengthen weather-, climate- and water-related sciences to advance progress towards achieving SDG 13.

SDG 14 Life Below Water

- Climate- and human-related impacts are threatening our oceans, affecting marine ecosystems and the communities that rely on them for food and livelihood security.
- Climate-related ocean science enhances our understanding of climate impacts on the ocean and contributes to strategies for sustainably managing and protecting marine ecosystems.
- The United Nations Decade of Ocean Science for Sustainable Development provides an unprecedented opportunity to mobilize the scientific community and accelerate ocean-related science.

SDG 17 Partnerships for the Goals

- Half of countries report not having multi-hazard early warning systems (MHEWSs) in place and, where they do exist, there are significant gaps in coverage.
- Weather-, climate- and water-related sciences underpin effective MHEWSs by enhancing the physical understanding of hazards, growing the understanding of the associated risks and impacts, and enabling the detection, monitoring and forecasting of hazards.
- Partnerships across diverse stakeholders, including the weather-, climate- and water-related science communities, are essential to deliver Early Warnings for All and achieve the SDGs.

MWP

13.3.2.5 Local Climate

There are a total of 25 synoptic stations located throughout Ireland. These stations are operated by Met Éireann. The parameters measured and recorded at these stations include rainfall, temperature, wind speed and direction, relative humidity, solar radiation, clouds, atmospheric pressure, sunshine hours, evaporation, and visibility. The nearest synoptic station to the proposed development is Valentia Observatory, approximately 10km north of the proposed development. The climate of the proposed development is best represented by data collected at this station. The average monthly precipitation, rainfall, and wind speeds for the 30 year period between 1991 and 2020 are summarised in **Table 13-7**.

Table 13-7 Valentia Observatory 1991-2020 Averages

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
TEMPERATURE (degrees Celsius)													
Mean temperature	7.4	7.5	8.2	9.6	11.7	13.8	15.3	15.4	14.3	12	9.5	8.1	11.1
SUNSHINE (hours)													
Mean daily duration	1.5	2.3	3.4	5.3	5.7	5.6	4.4	4.6	4	2.9	1.8	1.2	3.6
RAINFALL (mm)													
Mean monthly total	187	137.1	116.1	108.4	94.4	100.8	117.2	114.2	129.8	173	189.2	179.4	1646.5
Greatest daily total	41.58	51.6	49.05	55.1	42.1	51.8	60.6	53.1	99.26	131.6	56.7	56.3	131.6
WIND (knots)													
Mean monthly speed	11.3	11	9.9	9.1	8.6	8.1	7.8	7.8	8.3	9.2	10.1	11.2	9.4
Max. gust	82	74	73	65	63	50	48	52	67	68	69	88	88

13.3.2.6 Current GHG Emissions Ireland

The latest emissions data is available from the EPA (EPA Latest Emissions Data, July 2023) and is summarised as follows:

- In 2022, Ireland's GHG emissions are estimated to be 60.76 million tonnes carbon dioxide equivalent (Mt CO_2eq), which is 1.9% lower (or 1.19 Mt CO_2 eq) than emissions in 2021 (61.95 Mt CO_2 eq) and follows a 5.1% increase in emissions reported for 2021. Emissions in 2022 were 4.6% below pre COVID, 2019 figures.
- In 2022 emissions in the stationary ETS sector decreased by 4.3% and emissions under the ESR (Effort Sharing Regulation) decreased by 1.1%. When LULUCF is included, total national emissions decreased by 1.8%.
- Decreased emissions in 2022 compared to 2021 were observed in the largest sectors except for transport, waste and commercial services. These 3 sectors showed increases in emissions (+6.0%, +4.9%

and +0.2% respectively), shown highlighted red in the "Emissions change 2021 Emissions per capita decreased from 12.4 tonnes CO2eq/person in 2021 to 11.9 tonnes CO2eq/person in 2022. Ireland's average tonnes of GHG/capita over the last ten years were 12.7 tonnes. With recent CSO preliminary 2022 census data showing a population of 5.12 million people and with population projected to increase to 5.5 million in 2030, 5.9 million in 2040 and 6.2 million by 2050, per capita emissions need to reduce significantly. At current per capita emission levels, each addition 500,000 people would contribute an additional 6 million tonnes of CO2eq annually.

Latest assessment of compliance

The greenhouse gas emission inventory for 2021 was the first of ten years over which compliance with targets set in the European Union's Effort Sharing Regulation (EU 2018/842) will be assessed. This Regulation sets 2030 targets for emissions outside of the Emissions Trading Scheme (known as ESR emissions) and annual binding national limits for the period 2021-2030. Ireland's target was to reduce ESR emissions by 30% by 2030 compared with 2005 levels, with a number of flexibilities available to assist in achieving this. The ESR was amended in April 2023 and Ireland must now limit its greenhouse gas emissions by at least 42% by 2030. The ESR includes the sectors outside the scope of the EU Emissions Trading System (ETS) (such as Transport, Residential, Public Services and Commercial Services and Waste).

Ireland's ESR emissions annual limit for 2022 is 42.36 Mt CO2eq. Ireland's provisional 2022 greenhouse gas ESR emissions are 46.08 Mt CO2eq, this is 3.72 Mt CO2eq more than the annual limit for 2022. This value is the national total emissions less emissions generated by stationary combustion and aviation operators that are within the EU's emissions trading scheme. This indicates that Ireland is not in compliance with its 2022 Effort Sharing Regulation annual limit, exceeding the allocation by 1.82 Mt CO2eq after using the ETS flexibility and 0.99Mt CO2eq after using both ETS and LULUCF flexibilities. Agriculture and Transport accounted for 75.7% of total ESR emissions in 2022.

The latest projections (June 2023) indicate that currently implemented measures (With Existing Measures) will achieve a reduction of 10% on 2005 levels by 2030, significantly short of the 42% reduction target. If measures in the higher ambition (With Additional Measures) scenario are implemented, EPA projections show that Ireland can achieve a reduction of 30% by 2030, still short of the 42% reduction target.

The SEAI has published predicted emissions[4] for 2023 and have predicted Irelands GHG emissions to be 63.7 million tonnes carbon dioxide equivalent (Mt CO2eq).

13.3.2.7 Climate Change Trends in Ireland

Changes in Ireland's climate are in line with global trends including increasing temperatures, changes in precipitation patterns, and changes in the variability and intensity of storms. This has resulted in flooding events, sea level rise and sea surging events.

The main observed and projected in Irelands climate parameters (National Adaption Framework, 2024) are summarised in **Table 13-8** and **Table 13-9**:

Representative Concentration Pathways (RCPs), referenced in Table 13-9, refer to various scenarios that describe different 21st century pathways of GHG emissions and atmospheric concentrations, air pollutant emissions and land use.

[4] https://www.seai.ie/publications/National-Energy-Projections-2023.pdf

Table 13-8 Observed climate change trends in Ireland

Parameter	Observed
Temperature	• Ireland's temperature has varied in line with global trends with annual average surface air temperature increasing 1.01ºC over the last 120 years and 0.7ºC when comparing the period 1991-2020 to 1961-1990. The frequency of warm years has increased from the late 1980s to present – with fifteen of the top 20 warmest years on record occurring since 1990.
Precipitation	• Increased annual precipitation of 7% has been recorded between the period 1991-2020 comparted to 1961-1990. The decade 2011-2020 has been the wettest on record. Evidence suggests a trend towards increased winter rainfall and decreased summer rainfall.
Wind Speed and Storms	• Increasing wave heights over the last 70 years in the North Atlantic with winter season trends of increases up to 20 cm per decade, along with a northward displacement of storm tracks.
Sea Level and Sea Surface Temperature	• Satellite observations indicate the sea level around the coast of Ireland has increased by approximately 2-3mm per year since the 1990s • Average sea temperature has risen with measurements at Malin Head showing an increase in average sea temperatures of 0.47ºC over the last 10 years when compared to the period 1981-2010. Ocean acidity has also increased between 1991 and 2013.

Table 13-9 Projected Changes in Irelands Climate

Parameter	Projected Change
Temperature	• Ireland's climate is projected to warm incrementally across all future scenarios. Mid-century (2041-2070) annual mean temperatures are projected to increase by 1.08ºC (o.59 to 1.72ºC – 1oth and 90th percentiles) for RCP4.5 and 1.52ºC (1.14 to 1.93ºC) for RCP8.5. End of century (2071-2100) annual mean temperatures show increases of 1.48ºC (1.05 to 2.19ºC) under RCP 4.5 and 2.71º (1.96 to 3.34ºC) under RCP8.5. • The number of summer days *number of days when daily maximum temperature is >25ºC) are projected to increase. By mid-century, RCP4.5 projects an increase of 2.97 (0.86 to 5.34) more summer days, while RCP8.5 shows an increase of 4.74 (2.46 to 6.70) more summer days. By end of century, larger increases of 4.08 (1.36 to 6.47) and 11.03 (6.48 to 16.83) are evident for RCP4.5 and 8.5 respectively. • In a national context, the average number of frost days (days when the minimum temperature is below 0ºC) are projected to decrease by 16.18 (-22.09 to-8.84) days by mid-century for RCP4.5 and by 21.75 (-27.75 to-15.50) under RCP8.5. The end of century period sees a larger decrease in frost days, with a reduction of 21.10 (-27.20 to-14.99) and 31.42 (-36.95 to -24.71) under RCP4.5 and 8.5 respectively in comparison to the baseline. • The number of icing days (days when maximum temperature is lower than 0º=C) is projected to decrease.-0.24 (-.36 to-0.10) days change from the baseline for RCP4.5 by mid-century, and-0.30 (-0.36 to-0.20) in RCP 8.5.

Parameter	Projected Change
	For end of century, the change from the baseline goes to-0.30 (-0.36 to-0.19)-0.36 (-0.37 to-0.33) days for RCP4.5 and 8.5 respectively.
Precipitation	• Precipitation projections are more variable than temperature variables. Projected changes in summer precipitation by mid-century-1.79% (-12.54 to 8.68%) and 5.51% (-15.62% to 4.85%) for RCP4.5 and 8.5 respectively. End of century projections indicate changes of-1.97% (-12.86 to 6.82%) of precipitation for RCP4.5 and-7.28% (-2.76 to 6.57%) for RCP8.5 during the summer months. On an annual basis, end of century projections under RCP4.5 indicate changes in precipitation of 5.04% (0.3 to 9.87%) in reference to the baseline and 8.92% (1.21 to 15.96%) for RCP8.5 • Projections for heavy precipitation events are expected to increase annually with the number of days above 20mm increasing by 1.15 (0.06 to 2.44) days by mid-century for RCP4.5 and 1.69 (0.62 to 2.87) under RCP8.5.
Wind Speed and Storms	• Mean 10-m wind speeds are project to decrease for all seasons by mid-century. The decreases are largest for summer months under the very high GHG emissions scenatrio (RCP8.5). The summer reductions in 10-m wind speed range from 0.3% to 3.4% for the intermediate GHG emssions scenario (RCP4.5) and from 2% tp 5.4% for the very high GHG emissions scenatrio (RCP8.5).
Sea Level and Sea Surface Temperature	• Projections of sea level rise varies substantially around the coast of Ireland. Areas of the extreme southwest are likely to experience the largest increases in sea level at a rate of 3.3-4.8 mm per year and areas of the northeast coast are likely to experience sea level rise at a rate of 2.2-3.7 mm per year. Due to a limited understanding of some of the important effects driving sea level rise to a best estimate of future upper bound for sea level rise cannot be provided with confidence. • The seas around Ireland are project to continue to warm. Projected changes for the Irish Sea indicate a warming for all seasons with the highest in Autumn and lowest in Spring. Due to a limited number of climate model projections, projected changes remain uncertain.

13.3.2.8 County Kerry Extreme Weather Events

The World Meteorological Organization (WMO) established that the length of the reference period should be 30 years, with a recommendation to update the climate averages every 10 years to provide representative reference values for recent climatic conditions.

A review of extreme weather events over the period 1993 to 2023 has been undertaken using published Met Éireann data[5] and has been summarised below:

[5] Met Éireann, n.d. Major Weather Events. Online: Available at: < https://www.met.ie/climate/major-weather-events >. Accessed: March 2024

Table 13-10 Major Weather Events 1991 -2024

Extreme weather events	Date	Description
Coastal Storms	24th December 1997:	Windstorm.
	Dec 2013 – Feb 2014	Storms (12 diff days)
	16th Oct 2017	Storm Ophelia RED level Wind Warning.
	21st Oct 2017	Storm BRIAN: Wind
	2nd Jan 2018	Storm ELEANOR: Wind: Coastal Damage
	19th and 20th Aug 2020	Storm Ellen
	7th Dec 2021	Storm Barra
	18th Feb 2022	Storm Eunice
Extreme heat/drought	Summer 1995	Warmest weather since 1955
	Summer 2006	Warmest, driest sunniest summer since 1995
	Summer 2018	High temperatures and drought conditions.
	18th/19th November 2009	119mm 1-day recorded Cloon Lake.
	4th, 5th December 2015	Code RED Rainfall event.
	4th Dec 2015 – 13th Jan 2016	Rainfall/ground saturation.
	July 2022	Highest Temperature Recorded in Ireland since 1887
Freezing conditions	Winter 2009/2010: Dec,Jan,Feb:	Coldest winter 13/18 years
	28th Nov/13th Dec 2010:	Extreme cold/ice event/snow event
Heavy rainfall	Dec 2009/Jan 2010	Snow and ICE
	Dec 2010	Heavy Snow falls.
	January 2013	Heavy Snow
	December 2013	Heavy Snow
	24th Feb to 4th Mar 2018	Storm Emma Snow (RED) Warning
Pluvial flooding	May 2015	Flooding at Clievrag, Listowel
	4th, 5th December 2015	Code RED Rainfall event.
	Sept 2015	Flooding Clievragh, Listowel

Extreme weather events	Date	Description
	22nd Nov 2017	Flooding Ballyduff, Ballyheigue, Causeway
Storm force winds/windstorms	24th Dec 1997	Windstorm
	Dec 2013-Feb 2014	Winter Storms (12 diff days)
	12th Feb 2014	Storm Darwin "RED"
	16th Oct 2017	Ex Hurricane Orphelia RED level Wind warning
	19th and 20th Aug 2020	Storm Ellen – Status Red Wind Warning
	7th Dec 2021	Storm Barra
	18th Feb 2022	Storm Eunice

13.4 Potential Effects of the Proposed Development

13.4.1 Construction Phase

13.4.1.1 Air Quality

Dust Emissions

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (see Section 13.3.1.3). The major dust generating activities are divided into four types within the IAQM (2024) guidance to reflect their differential effects.

These are:

- Demolition;
- Earthworks;
- Construction; and
- Track-out (movement of heavy vehicles).

Demolition

The proposed development includes the demolition of parts of the exiting hotel structure. The accommodation half of the structure is constructed from concrete and the proposed renovation will require the removal and rearrangement of some internal walls. The ground level catering half of the hotel is in ruins and much of the remaining roof, beams and walls will be demolished and removed, before being rebuilt.

The dust emission magnitude from demolition works can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- Large: Total building volume >75,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12m above ground level;

- **Medium**: Total building volume 12,000m^3 – 75,000m^3, potentially dusty construction material, demolition activities 6-12m above ground level; and
- **Low**: Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6m above ground, demolition during wetter months.

The total volume of hotel to be demolished is less than 12,000m^3 and therefore the demolition works are classified as small. The sensitivity of the area, as determined in **Section 13.3.1.3**, is combined with the dust emission magnitude for each dust generating activity to define the risk of dust effects in the absence of mitigation. **Table 13-12** shows the risk of dust effects in terms of dust soiling, health effects and ecology during the demolition activities. This risk is as a result of the proposed demolition activities in the absence of mitigation.

Table 13-11 Criteria for Rating Risk of Dust Effects – Demolition

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 13-12 Risk of Dust Effects – Demolition

Receptor	Receptor Sensitivity	Dust Emission Magnitude – Earthworks	Risk of Dust Related Effects
Dust Soiling	Medium	Small	Low Risk
Human Health	Low		Negligible
Ecological	High		Low Risk

Earthworks

Earthworks primarily involve excavating material, loading and unloading of materials, tipping and stockpiling activities. Activities such as levelling the site and landscaping works are also considered under this category. The dust emission magnitude from earthworks can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large**: Total site area > 10,000m2, potentially dusty soil type (e.g. clay which will be prone to suspension when dry due to small particle size), > 10 heavy earth moving vehicles active at any one time, formation of bunds > 8m in height, total material moved >100,000 tonnes,;
- **Medium**: Total site area 2,500m2 – 10,000m2, moderately dusty soil type (e.g. silt), 5 – 10 heavy earth moving vehicles at any one time, formation of bunds 4-8m in height, total material moved 20,000 – 100,000 tonnes;
- **Small**: Total site area <2,500m2, soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4m in height, total material moved <20,000 tonnes, earthworks during wetter months.

The total developable site within the EIAR application is > 10,000m^2; therefore, the proposed earthworks can be classified as large. The sensitivity of the area, as determined in **Section 13.3.1.3**, is combined with the dust emission magnitude for each dust generating activity to define the risk of dust effects in the absence of mitigation. **Table 13-12** shows the risk of dust effects in terms of dust soiling, health effects and ecology during the earthworks activities. This risk is as a result of the proposed earthworks activities in the absence of mitigation.

Table 13-13 Criteria for Rating Risk of Dust Effects – Earthworks

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 13-14 Risk of Dust Effects – Earthworks

Receptor	Receptor Sensitivity	Dust Emission Magnitude – Earthworks	Risk of Dust Related Effects
Dust Soiling	Medium	Large	Medium
Human Health	Low		Low
Ecological	High		High

Construction

Dust emission magnitude from construction can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- Large: Total building volume > 100,000 m3, on site concrete batching, sandblasting;
- Medium: Total building volume 25,000 m3 – 100,000 m3, potentially dusty construction material (e.g. concrete), on site concrete batching;
- Small: Total building volume < 25,000 m3, construction material with low potential for dust release (e.g. metal cladding or timber).

The proposed development is classified as Medium magnitude. Table 13-15 shows the risk of dust effects in terms of dust soiling, health effects and ecology during the earthworks activities. This risk is as a result of the proposed earthworks activities in the absence of mitigation.

Table 13-15 Criteria for Rating of Dust Effects – Construction (IAQM, 2024)

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 13-16 Risk of Dust Effects -Construction

Receptor	Receptor Sensitivity	Dust Emission Magnitude – Earthworks	Risk of Dust Related Effects
Dust Soiling	Medium	Medium	Medium
Human Health	Low		Low
Ecological	High		Medium

Trackout

Factors which determine the dust emission magnitude are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emissions from track-out can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- Large: > 50 HGV (> 3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100m;
- Medium: 10 – 50 HGV (> 3.5 t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 – 100m;
- Small: <10 HGV (>3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50m.

The dust emission magnitude for the proposed track-out can be classified as **medium** as there will be a maximum of 20 inbound and 20 outbound HGV movements per day during the first phase of construction. It should be noted that for phase 2 to phase 4, the max amount of HGV movements will be less than 10 HGVs and therefore, the magnitude of the proposed track-out activities during these phases will be classed as **small** and thus risk of dust effects during phase 2 to phase 4 will be low risk for dust soiling/ecological receptors and negligible risk to human health.

Table 13-17 shows the risk of dust effects in terms of dust soiling, health effects and ecology during the track out activities. This risk is as a result of the proposed track-out activities in the absence of mitigation.

Table 13-17 Criteria for Rating of Dust Effects – Trackout

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 13-18 Risk of Dust Effects – Trackout

Receptor	Receptor Sensitivity	Dust Emission Magnitude – Earthworks	Risk of Dust Related Effects
Dust Soiling	Medium	Medium	Medium
Human Health	Low		Low
Ecological	High		Medium

Summary of Dust Emission Risk

It should be noted that the dust emissions have been calculated for the worst case scenario which will be Phase 1 of the proposed development. Phase 1 will be the longest phase of construction and will include most of the earth works for roads and services. Consequently, Phase 1 represents the period with longest and largest dust emission magnitude potential. Phase 1 will be carried out over an approximate 18 months and will continue through one peak holiday period. Phase 2 to Phase 4 of the construction will have stoppages in July and August and will be for temporary periods and construction works will be carried out over smaller footprints. There will be less likelihood of dust given that works are outside of the summer seasons where dust is more prevalent. Therefore, the dust effects from phase 2 to phase 4 will not be significant.

The risk of dust effects as a result of the proposed development are summarised in Table 13-19 or each activity. The magnitude of risk determined is used to prescribe the level of site-specific mitigation required for each activity to prevent significant effects occurring.

Overall, to ensure that no dust nuisance occurs during the earthworks, construction and trackout activities, a range of dust mitigation measures associated with medium to high risk of dust effects must be implemented. When the dust mitigation measures detailed in the mitigation section of this chapter in Section 13.5.1 are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors.

Table 13-19 Summary of construction phase dust effect risk used to define site-specific mitigation

Potential Effect	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium	Medium
Human Health	Low	Low	Low	Low
Ecological	High	High	Medium	Medium

Effect Rating

In the absence of mitigation, dust effects are predicted to be negative, moderate to significant, short-term to temporary, localised and direct or sensitive receptors. Table 13-20 shows the significance of construction phase dust effects in relation to dust soiling, human health and ecological receptors.

Table 13-20 Construction Effect 1: Dust Emissions on Sensitive Receptors

Construction Effect 1: Dust emissions on Sensitive Receptors						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Dust Soiling	Negative	Moderate	Local	Temporary to Short-Term	Direct	Likely
Human Health	Negative	Not Significant	Local	Temporary to Short-Term	Direct	Likely
Ecological	Negative	Significant	Local	Temporary to Short-Term	Direct	Likely

<u>Construction Traffic Emissions</u>

Phase 1 of the construction will last over a period of 18 months whereas Phase 2-4 will be carried out over the off-season period. There is potential for traffic emissions to have short-term to temporary effects on air quality with respect to human health and ecology over the construction phase, particularly, due to the increase in HGVs accessing the site. The construction stage traffic has been reviewed and a detailed air quality assessment has been scoped out as none of the road links effected by the proposed development satisfy the TIII assessment criteria in Section 13.2.2.1.

Effect Rating

Construction stage traffic will likely have a negative, imperceptible, local, direct and temporary to short-term effect on air quality.

Table 13-21 Construction Effect 2: Traffic Emissions on Air Quality

Construction Effect 2: Traffic Emissions on Air Quality						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre - Mitigation	Negative	Imperceptible	Local	Temporary to Short-Term	Direct	Likely

13.4.1.2 Climate

There is the potential for a number of greenhouse gas emissions to the atmosphere during the construction phase of the proposed development. Construction vehicles, generators etc. may give rise to CO_2 and N_2O emissions. The Institute of Air Quality Management Guidance document on the Assessment of Dust from Demolition and Construction (IAQM, 2024) states that site traffic and plant is unlikely to make a significant impact on climate.

Effect Rating

The impact of the construction phase on climate is considered likely to be negative, imperceptible, extensive, temporary to short-term and direct.

Table 13-22 Construction Effect 3: GHG Emissions Effect on Climate

Construction Effect 3: GHG Emissions on Climate						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre - Mitigation	Negative	Imperceptible	Extensive	Temporary to Short-Term	Direct	Likely

13.4.2 Operational Phase

13.4.2.1 Air Quality

<u>Operation Traffic Emissions</u>

There is the potential for a number of emissions to the atmosphere during the operational phase of the development. In particular, the traffic-related air emissions may generate quantities of air pollutants such NO_2, CO, Benzene and PM_{10}.

The operational stage traffic has been reviewed and a proposed development will not increase traffic levels by more than the scoping criteria (see Section 13.2.3.1). Therefore, an assessment of the effect of traffic emissions during the operational phase on ambient air quality is not necessary as no significant effects are likely.

Effect Rating

The effect to air quality from traffic emissions during the operational phase of the development will likely be negative, imperceptible, local, long-term and direct.

Table 13-23 Operational Effect 1: Traffic Emissions Effect on Air Quality

Operational Effect 1: Traffic emissions Effect on Air Quality						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre – Mitigation	Negative	Imperceptible	Local	Long-term	Direct	Likely

<u>Air Quality Effect on Designated Sites</u>

An assessment of the impact of NOx (NO and NO2) emissions resulting from the traffic associated with the proposed development has been undertaken using the approach outlined in the TII guidance (TII, 2022a). Assessment of the ecologically sensitive sites listed in Section 13.2.3.1 has been carried out. The TII REM Tool was used for calculations, refer to the results in Table 13-24 to Table 13-26 for years 2026, 2031 and 2041.

Table 13-24 Assessment of NOx Concentrations and NO2 Dry Deposition Effect in Designated Sites 2026

Distance to Roads	NOx Conc. (μ/m3)			Nutrient N Deposition	Acid Deposition
	Do Nothing	Do Something	NOx Impact	(kg/ha/year)	(keq/ha/year)
1- 10m	0.14 to 0.13	0.24 to 0.22	.1 to .09	.12	0.01
20	0.10	0.16	.06	0.11	0.01
30	0.07	0.13	.06	0.06	0
40	0.06	0.10	.05	0.06	0
50	0.04	0.08	.04	0.06	0
60	0.04	0.06	.02	0.05	0
70	0.03	0.05	.02	0	0
80	0.02	0.04	.02	0	0
90	0.02	0.03	.01		0
100	0.01	0.02	.01	0	0
110	0.01	0.02	.01	0	0
120	0.01	0.01	0	0	0
130	0.01	0.01	0	0	0
140	0.01	0.01	0	0	0
150	0	0.01	0	0	0
160	0	0.01	0	0	0
170	0	0.01	0	0	0
180	0	0.01	0	0	0
190	0	0	0	0	0
200	0	0	0	0	0

Table 13-25 Assessment of NOx Concentrations and NO2 Dry Deposition Effect in Designated Sites 2031

Distance to Roads	NOx Conc. (μ/m3)			Nutrient N Deposition	Acid Deposition
	Do Nothing	Do Something	NOx Effect	(kg/ha/year)	(keq/ha/year)
1- 10m	0.09 to 0.08	.29 to .26	.2 to .18	.28	.02
20	0.06	.20	.14	.18	.01
30	0.05	.15	.1	.17	.01
40	0.04	.12	.08	.11	.01.
50	0.03	.09	.06	.11	.01
60	0.02	.07	.04	.06	0
70	0.02	.06	04	.05	0
80	0.01	.05	.04	.05	0
90	0.01	.04	.03	.05	0
100	0.01	.03	.02	0	0
110	0.01	.02	.01	0	0
120	0.01	.02	.01	0	0
130	0	.01	.01	0	0
140	0	.01	.01	0	0
150	0	.01	.01	0	0
160	0	.01	.01	0	0
170	0	.01	.01	0	0
180	0	.01	.01	0	0
190	0	.01	.01	0	0
200	0	0	0	0	0

Table 13-26 Assessment of NOx Concentrations and NO2 Dry Deposition Effect in Designated Sites 2041

Distance to Roads	NOx Conc. (μ/m3)			Nutrient N Deposition	Acid Deposition
	Do Nothing	Do Something	NOx Effect	(kg/ha/year)	(keq/ha/year)
1- 10m	.07 to .06	.22 to .20	.15 to .14	.28	.02
20	.05	.15	.1	.22	.02
30	.04	.12	.08	.17	.01
40	.03	.09	.05	.11	.01
50	.02	.07	.04	.11	.01
60	.02	.06	.04	.05	.00
70	.01	.04	.03	.05	0
80	.01	.03	.02	.05	0
90	.01	.03	.02	.05	0

Distance to Roads	NOx Conc. (μ/m3)			Nutrient N Deposition	Acid Deposition
	Do Nothing	Do Something	NOx Effect	(kg/ha/year)	(keq/ha/year)
100	.01	.02	.01	.05	0
110	.01	.02	.01	0	0
120	0	.01	.01	0	0
130	0	.01	.01	0	0
140	0	.01	.01	0	0
150	0	.01	.01	0	0
160	0	.01	.01	0	0
170	0	.01	.01	0	0
180	0	.01	.01	0	0
190	0	0	0	0	0
200	0	0	0	0	0

The Critical Loads are set out on the Air Pollution Information System website (Centre for Ecology and Hydrology (CEH), 2022). Although this website is UK based, the AG4 Guidance stipulates that Critical Loads for the equivalent type of habitats should be used. The predicted annual average NOx level for each year is below the critical level of 30 μg/m^3 at the designated sites and below the N deposition critical load of 10 to 20 μg/m^3.

The highest level of acid deposition at the ecological receptors is calculated as .02 (keq/ha/year). Using the critical load function tool of the APIS website, there were no exceedances of critical load.

Effect Rating

In accordance with the EPA Guidelines (EPA, 2022) the ecological effects associated with the operational phase traffic emissions are overall neutral, imperceptible, local, long-term and direct.

Table 13-27 Operational Effect 2: Traffic Emissions Air Quality Effects on Designated Sites

Operational Effect 1: Traffic emissions effect on Air Quality						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre - Mitigation	Neutral	Imperceptible	Local	Long-term	Direct	Likely

13.4.2.2 Climate

GHG Emissions

There is the potential for increased traffic volumes to effect climate during the operational phase of the proposed development. The change in traffic was reviewed against the criteria set out in Section 13.2.3.2. It was deemed necessary to carry out a detailed climate assessment of traffic emissions.

There is the potential for a number of greenhouse gas emissions to atmosphere during the operational phase of the development. The associated CO2 emissions with the link (Reenroe Beach Access Road) which will experience the largest increase in traffic is shown in Table 13-28 for years 2026, 2031 and 2041.

The predicted concentrations of CO_2 for the future years are significantly less than the 2030 targets set out under EU legislation. It is predicted that in 2026 the proposed development will increase emissions by 0.005% of the EU 2030 target and in 2031/2041, the proposed development will increase emissions by 0.015% of the EU 2030 target.

Table 13-28 Climate Effect Assessment

Year	Scenario	CO_2 (tonnes/annum)
2026	Do Nothing	2,745
	Do Something	4,618
2031	Do Nothing	2,737
	Do Something	8,409
2041	Do Nothing	2,761
	Do Something	8,433
Increment 2026		1,873 Tonnes
Increment 2031		5,672 Tonnes
Increment 2041		5,672Tonnes
Emission Ceiling (kilo Tonnes 2026		37,943
Emission Ceiling (kilo Tonnes 2031		37,943
Emission Ceiling (kilo Tonnes 2041		37,943
Effect in 2026		.005%
Effect in 2031		.015%
Effect in 2041		.015%

Note 1 Target under European Commission Decision 2017/1471 of 10th August 2017 and amending decision 2013/162/EU to revise Member States' annual emissions allocations for the period from 2017 to 2020.

Note 2 Target under Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013

Effect Rating

During the operational stage the increase in ghg emissions will likely be negative, imperceptible, extensive, long-term and direct.

Table 13-29 Operational Effect 3: GHG Emissions Effect on Climate

Operation Effect 3: GHG Emissions Effect on Climate						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre - Mitigation	Negative	Imperceptible	Extensive	Long Term	Direct	Likely

Effect of Climate Change on the Proposed Development

Effects associated with climate change which could potentially effect the proposed development include the following:

- Flood risk due to increased precipitation, intense periods of rainfall and rising sea levels

- Coastal Erosion
- Increased Temperatures
- Ice or snow
- Major Storm Damage

Climate adaptation seeks to ensure adequate resilience to the adverse effects of major events associated with climate change., Anticipating potential risks and adaptating the design of the proposed development aims to ensure that potential climate change effects will not significantly effect the operational phase of the proposed development.

Floods and Rising Sea Levels

A flood risk assessment was carried out by MWP and determined that the proposed development was located in Flood Zone B or C.

The Flood Risk Management Guidelines defines these zone types as follows:

- *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 year and 0.5% or 1 in 200 for coastal flooding).
- *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 of the plan which are not in zones A or B.

Fluvial Flooding

Fluvial flooding occurs when the capacity of the river channel is exceeded and water flows into the adjacent land or flood plain.

OPW maps area indicated no instances of flooding within the leisure park site itself. There is a river located to the west of the site that runs into the ocean. The main hotel is 360 meters away from the river. The river is 160 meters from the site edge. The OPW maps, Figure 13-4 indicate that in present conditions ay 1% AEP (1 in 100 year), there is fluvial flooding around the river that extends to the boundary of the site. The same is true in the 0.1% AEP Scenario. There is no infrastructure proposed for this area. The area in which fluvial flooding is predicted to take place in the 0.1% flood expands but the mapping indicates that it does not expand eastwards towards the site. It instead expands north away from the site perimeter.

Pluvial Flooding

Pluvial flooding or overland flow occurs when rainfall intensity exceeds the infiltration capacity of the ground. The excess water flows overland to the nearest watercourse or results in the ponding in low areas or upstream of physical obstructions. Overland flow is most likely to occur following periods of sustained rainfall that cause the ground surface to become saturated by high intensity short duration rainfall events.

The proposed hotel will be located at the same location as the original structure and is also on a similar overall footprint. The region which the hotel and leisure park are located in has no history of pluvial flooding and it is unlikely that the proposed development will change the existing flow paths on the site.

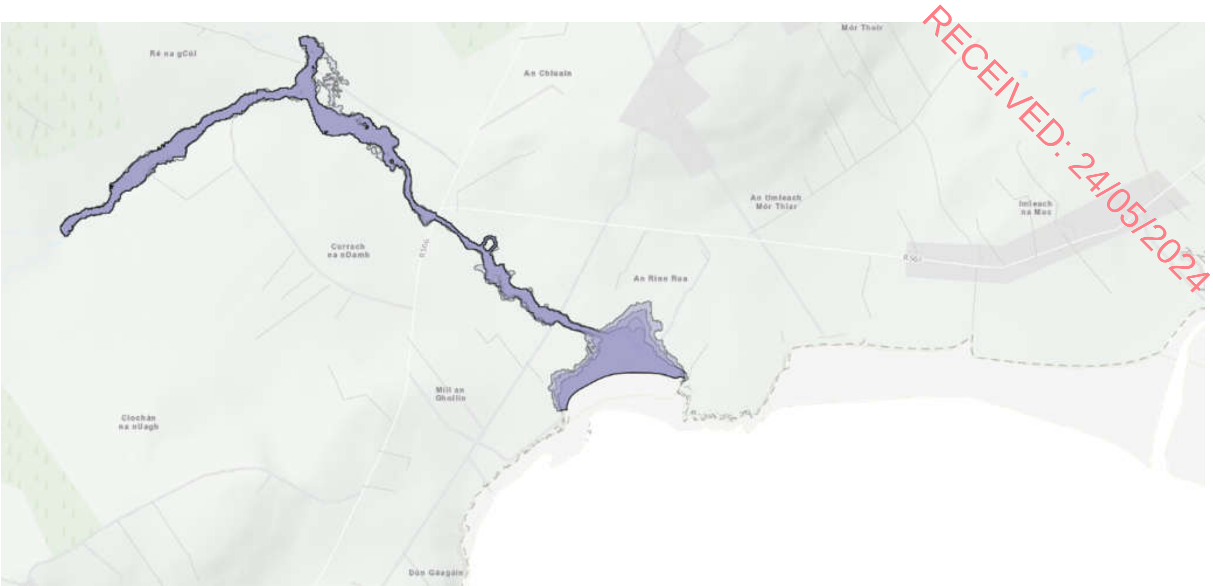

Figure 13-3 Fluvial Flooding 1% & 0.1% AEP (www.floodmaps.ie)

Coastal Flooding

Coastal flooding occurs when extreme high tides and/or storm surges result in abnormally high water surface levels. The OPW has undertaken modelling to quantify the Coastal flood risk around the coast. The relevant location to Rinn Rua is Point SW12, Figure 13-5. These levels are presented in Table 13-30 for a variety of scenarios and return probabilities. The High End Future Scenario (HEFS) maps represent a projected future scenario for the end of century (circa 2100) and includes allowances for projected future changes in sea levels and glacial isostatic adjustment (GIA). The maps include an increase of 1000mm in sea levels above the current scenario estimations. The flood extent of these levels along the coast is presented for the 0.1% AEP and 0.5% AEP for Rinn Rua in Figures 13-6 and 13-7. It is evident that even in the extreme 1000 year HEF scenario that the Coastal flood level does not effect the proposed development. The lowest floor level on the site being 5.1m ODM.

Table 13-30 South West Point SW12 - Water Level (OD Malin OSGM15 in meters)

			Scenario		
AEP	Present Day	MRFS	HEFS	H+EFS	H++EFS
50%	2.16	2.66	3.16	3.66	4.16
20%	2.23	2.73	3.23	3.73	4.23
10%	2.28	2.78	3.28	3.78	4.28
5%	2.33	2.83	3.33	3.83	4.33
2%	2.40	2.90	3.40	3.90	4.40
1%	2.44	2.94	3.44	3.94	4.44

	Scenario				
AEP	Present Day	MRFS	HEFS	H+EFS	H++EFS
0.5%	2.49	2.99	3.49	3.99	4.49
0.1%	2.60	3.10	3.60	4.10	4.60

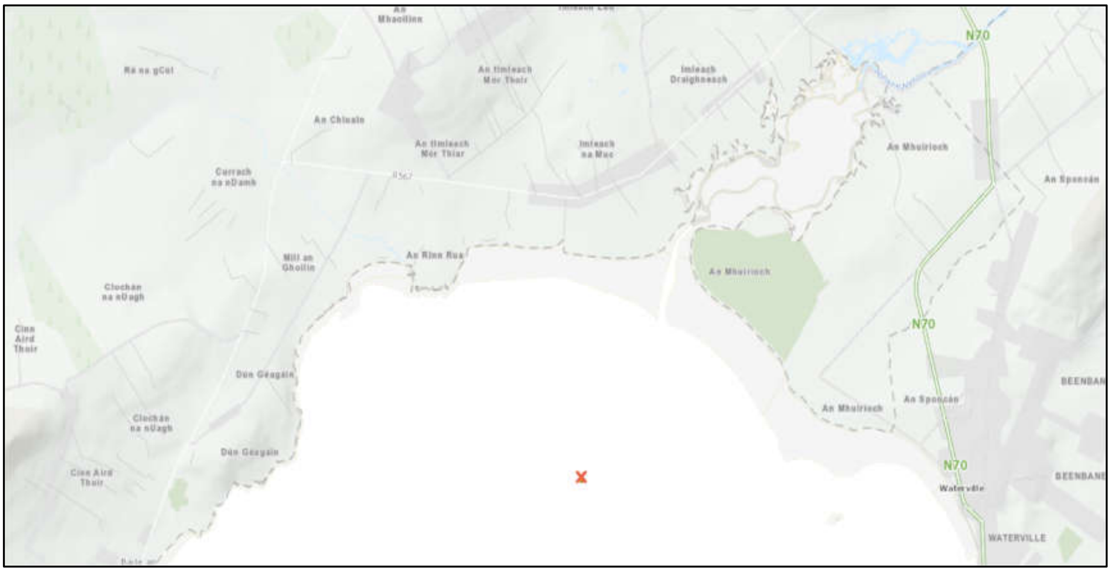

Figure 13-4 Location of Model Point SW12

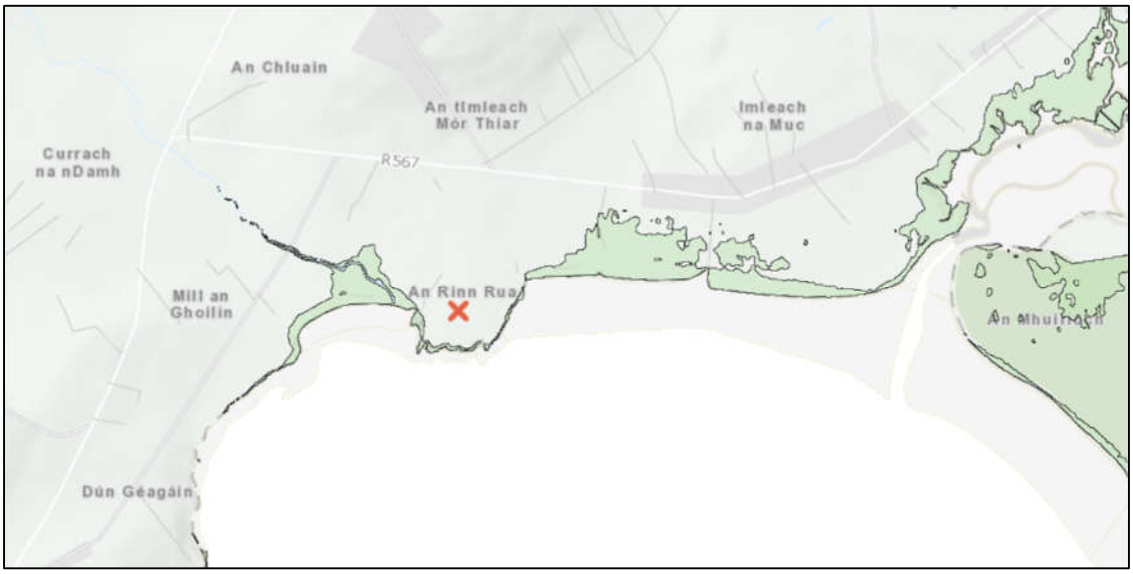

Figure 13-5 High 0.1% AEP

Figure 13-6 High end 0.5% AEP

Groundwater Flooding

Groundwater flooding occurs when the water table rises to the level of the ground surface due to rainfall and flows out over the surface. The ground in the vicinity of the site generally has reasonable permeability. Given proximity to the sea the water table level is likely to be similar to the tidal levels.

Floods and Rising Sea Levels Conclusion

The flood risk assessment has identified that the site is within Flood Zone C as defined in the Flood Risk Management Guidelines and is appropriate for the development of this hotel and leisure park.

The topography ensures that the proposed lowest ground elevation is at 5.1 mOD will be positioned well beyond and above any potential flood levels. The recommended finished floor level is 5.4 mOD.

Effect Rating

The potential of flood risk and rising sea levels to the proposed development are therefore neutral, imperceptible, local, long-term and direct.

Table 13-31 Operational Effect 4: Flood and Rising Sea Levels

Operation Effect 4: Flood and Rising Sea Levels						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre - Mitigation	Neutral	Imperceptible	Local	Long Term	Direct	Likely

<u>Coastal Erosion</u>

Coastal erosion typically effects areas close to sea level, where the land is vulnerable to being eroded by waves, currents and tidal action.

As mentioned above in the flood assessment section, the hotel floor is designed at a level which is above sea level and future predicted sea levels. This provides an adequate buffer between the proposed development and shoreline and therefore the risk of coastal erosion effecting the hotel directly is greatly reduced.

If the hotel floor is situated well above sea level, it means that even during high tides or storm surges, the water level will not reach the proposed development structure. The elevation of the proposed development provides a natural protection against the immediate effects of coastal erosion.

Effect Rating

The potential effect of coastal erosion on the proposed development is likely to be neutral, imperceptible, local, long-term and direct.

Table 13-32 Operational Effect 5: Coastal Erosion

Operation Effect 5: Coastal Erosion						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre - Mitigation	Neutral	Imperceptible	Local	Long Term	Direct	Likely

<u>Increased Temperatures</u>

Future climate prediction undertaken by the EPA and have been published in the document 'Research 339: High-resolution Climate Projections for Ireland – A Multi-model Ensemble Approach'. It is predicted that mid-century annual temperatures could increase by 1-1.2^{o}C or 1.3-1.6^{o}C, depending on the future emission scenario. For context, the max average temperature of area is 15.4^{o}C while the low average temperature is 7.4^{o}C, refer to Section 13.3.2.5.

Increases in temperature are a major contributor to much of the effects of global climate change, including melting of polar ice caps and causing shifts in global weather patterns. In terms of effects to the proposed development, increase in temperatures will not directly effect the proposed development. An increase in temperature can cause materials of buildings to heat up however the proposed development will be constructed in accordance with Building Regulations. Only sustainable materials which can perform in longevity and are resistant to changes in temperature will be chosen. Increased temperatures are predicted to occur rarely to occasionally, depending on the rate of climate change.

An increase in temperature can also effect the thermal comfort of holiday makers in Ireland. Although historic climate records show that Ireland experiences generally mild temperature weather, the increase of heatwaves associated with climate change will result in people feeling excessively hot, especially during the summer months. Warmer temperatures often coincide with increased humidity which can exasperate feelings of discomfort, making indoor spaces feeling stiffy and less pleasant for guests.

The location of the hotel beside the seaside is beneficial during increased temperatures given that seaside areas tend to have cooler temperature compared to inland regions during hot weather. The sea breeze can provide a natural cooling effect, making it more comfortable for people to spend time outdoors.

The accommodation and hotel facilities will incorporate effective cooling systems such as air conditioning to maintain comfortable indoor temperatures during periods of increased temperature.

During increased temperatures, the hotel will provide amenities for guests which , who seek outdoor amenities such as shaded hotel green areas, patios and swimming pool.

Effect Rating

The effects of increased temperatures on the facilities and visitors of the proposed development will be unlikely to be **negative, not significant, local** and **temporary (occurring rarely)**.

The effects of increased increased temperatures on visitors of the proposed development infrastructure and business is **unlikely** and will be, **not significant, local** and **temporary (occurring rarely)**.

Table 13-33 Operational Effect 6: Increased Temperatures on Proposed Development Infrastructure and Business

Operation Effect 6: Increased Temperatures on Proposed Development Infrastructure and Business						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre - Mitigation	Negative	Not significant	Local	Temporary (occurring rarely)	Direct	Likely

Table 13-34 Operational Effect 7: Increased Temperatures on Proposed Development Visitors/Employees

Operational Effect 7: Increased Temperatures on Proposed Development Visitors/Employees						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre - Mitigation	Negative	Not significant	Local	Temporary (occurring rarely)	Direct	Unlikely

<u>Ice or Snow</u>

The EPA document 'Research 339: High-resolution Climate Projections for Ireland – A Multi-model Ensemble Approach' is predicting that a potential 50% decrease in the frost and ice days for future emission scenarios by mid-century which to decrease by between 51% and 60%.

Climate change in Ireland will likely experience milder and wetter winters due to global warming. Warmer temperatures could reduce the likelihood of snowfall and snow is also less likely at coastal areas.

The proposed development infrastructure will be required to withstand the effects of ice or snow occurring occasionally. The hotel incorporates design to mitigate against snow loads to prevent damage when such effects

Accumulation of snow and ice can exert weight on buildings, especially on roofs. In cold weather, water pipes in buildings infrastructure can freeze, leading to burst pipes and subsequent water damage.

Ice accumulation on power lines and utility poles can cause power outages by bringing down power lines or disrupting electrical equipment.

Snowfall and icy conditions can pose challenges for visitor travel, potentially leading to delayed or closed roads, and difficulties in transportation. This can result in cancellations or changes in travel plans, affecting hotel bookings and occupancy rates.

During inclement weather, guests may prefer to stay indoors and utilize hotel amenities such as leisure facility, restaurant, bar and café.

Effect Rating

The effects of ice or snow as a result of climate change on the proposed development infrastructure and business are unlikely to occur and, in any case, would occur **rarely** and would result in a **negative**, **temporary**, **not significant**, and **localised effect**.

The effects of ice or snow as a result of climate change on hotel visitors/employees are **unlikely** to occur in any case would occur **rarely** and would be **negative**, **temporary**, **not significant**, and **localised effect**.

Table 13-35 Operational Effect 8: Ice or Snow Effects on Proposed Development Visitors/Employees

Operation Effect 8: Ice or Snow Effects on Proposed Development Visitors/Employees						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre - Mitigation	Negative	Not Significant	Local	Temporary (occurring rarely)	Direct	Unlikely

<u>Major Storm Damage</u>

Major storms have the capacity to cause damage to infrastructure. High winds, storm surges, and heavy rainfall can cause structural damage to buildings, including hotels.

During storms, loose furnishings around the park will be removed or tied down. For stability, the mobile homes and lodges are anchored to the concrete bay in 4 places as per manufacturer guidelines.

In terms of how major storm damage effects hotel visitors, there will be safety concerns for visitors and employees of the proposed development. There may be disruption to travel during storm activity and during such times, the hotel management may close accommodation facilities, if necessary.

Effect Rating

In the absence of mitigation, intense storms would **likely** result in a **negative**, **moderate to significant**, **temporary**, **local** and **direct** effect on the proposed development infrastructure.

In the absence of mitigation, intense storms would likely result in a **negative**, **moderate to significant**, **temporary**, **local** and **direct** effect on the proposed development visitors and employees.

Table 13-36 Operational Effect 9: Major Storm Damage Effects on Proposed Development Infrastructure and Business

Operation Effect 9: Major Storm Damage Effects On Proposed Development Infrastructure and Business						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre - Mitigation	Negative	Moderate to significant	Local	Temporary	Direct	Likely

Table 13-37 Operational Effect 10: Major Storm Damage Effects On Proposed Development Visitors/Employees

Operation Effect 10: Major Storm Damage Effects On Proposed Development Visitors/Employees						
	Quality of Effect	Significance	Spatial Extent	Duration	Other Relevant Criteria	Likelihood
Pre - Mitigation	Negative	Moderate to significant	Local	Temporary	Direct	Likely

13.4.3 Decommissioning Phase

No decommissioning phase is envisaged for this development.

13.4.4 Do Nothing

In the Do Nothing scenario, ambient air quality will remain as per the baseline and will change in accordance with trends within the wider area. If the site remains undeveloped, it will continue to have no negative effect on existing ambient air quality or on the local micro climate. The general air quality in the area is of a good level and is within the air quality guidelines for the protection of human health. With the implementation of the numerous climate measures set out under various government plans, including the Climate Action Plan 2023, emissions of pollutants from road traffic, including NO_2, PM_{10}, $PM_{2.5}$ and CO_2 will likely decrease in future years with the addition of further electric vehicles to the fleet and the phasing out of fossil fuel vehicles.

Any increase in traffic related emissions, without the subject development would be insignificant. This increase above the existing situation would be minor and would not result in a perceptible change in the existing local air quality environment.

13.4.5 Cumulative Effects

Cumulative impacts result from a number of activities in the study area which may impact on the existing noise environment. Section 1.6.2.5 of Chapter 1 of this EIAR details applications within 10km of the proposed development site and identified around 48 residential dwellings that were granted planning within the last 5 years. The majority of these planning applications in the surrounding area consist of small scale works to existing dwellings or applications to construct new dwellings.

In addition to small scale residential planning applications, 13 non-residential development planning applications were approved in the last 7 years. All are related to tourism activities. Six of these were in the pre-covid period and are likely to be completed and will therefore have no cumulative effect with the proposed development. One of these (No. 1 - the Hogs Head Hotel complex in 2017) and the last two more recently included the provision of new tourism accommodation. This Hogs Head Hotel facility is an operational luxury hotel located within a golf estate on the east side of Waterville town on the banks of Lough Currane. Entry 7 in Table 1-5 of Section 1.6.2.5 was granted in 2021 and includes the development of six self-catering accommodation units . Three more recent planning applications (see number 9, 12 and 13 Table 1-5 of Section 1.6.2.5) involve the development of 5, 9 and 7 glamping pods and associated facilities. One of these (number 11 is in Ballinskelligs) and the others in Portmagee and Cahersiveen. One (see No.8) provides a viewing area, path and car park in Ballinskelligs. The two more recent applications involve upgrades and additions to existing tourism businesses that do not include the provision of new tourist accommodation. The decisions on four of these applications are still pending or require further information.

Considering the above developments in combination with the proposed development, there are no significant cumulative air effects predicted as a result of development other than this proposed development.

13.5 Mitigation

13.5.1 Construction Stage

13.5.1.1 Air Quality

The objective of dust control at site is to ensure that no significant nuisance occurs at nearby sensitive receptors. The construction phase is limited and short in duration. Construction works will be avoided during peak holiday periods, for phase 2 to phase 4. Construction during peak holiday periods will only occur during phase 1 of the proposed development.

In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK (IAQM (2014), The Scottish Office (1996), UK Office of Deputy Prime Minster (2002) and BRE (2003)) and the USA (USEPA (1997)).

A full traffic management plan and dust management plan will be incorporated into the Construction Environmental Management Plan (CEMP) in order to minimise such emissions as a result of the construction phase of the development. This will be generated specifically for the proposed development when detailed design is completed.

Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies. A Dust Management Plan (DMP) will be prepared and agreed with the stakeholders for implementation on-site. A DMP is a documented site-specific operational plan to prevent or minimise the release of dust from the site. It describes the management and operational actions the site will use to deal with both anticipated (e.g. forecast) and actual high risk conditions (e.g. dry days with measured winds above moderate breeze). The DMP will describe the conditions under which dust is most likely to pose a risk of dis-amenity at sensitive receptors close to the site and set trigger levels which, when exceeded, would require further dust control measures to be implemented (i.e. over and above the routine measures)

At the construction planning stage, the siting of activities and storage of materials will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance. As the prevailing wind is predominately south-westerly, locating materials downwind (to the north east) of sensitive receptors, where possible, will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.20 mm/day, dust generation is generally suppressed (UK Office of Deputy Prime Minister (2002), BRE (2003)). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 Knots) (at 7m above ground) to release loose material from storage materials and other exposed surfaces (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable with regards to wind speed in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The operator must monitor performance to ensure that the proposed mitigation measures are implemented and that dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;

- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- All dust control conditions contained within shall be achieved.
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practices and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

Site Roads and Routes

Movement of transportation trucks and plant trucks along haul roads (in particular unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of supressing dust emissions from unpaved roads to apply speed restrictions.

- Bowsers or suitable watering equipment will be available during periods of dry weather through the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained periods to ensure that unpaved areas are kept moist. The required application rate frequency will vary according to soil type, weather conditions and vehicular use;
- When required, any hard surface roads will be swept to remove mud and aggregate materials from their surface.

Site traffic on Public roads

Spillage and blow off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed, covered or wetted at all times to restrict the escape of dust;
- Public roads directly outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

Summary of Dust Mitigation Measures

The proactive control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the operator.

A full traffic management plan and dust management plan will be incorporated into the Environmental Management System in order to minimise such emissions as a result of the operational phase of the development. This will be generated specifically for the proposed development when detailed design is completed.

In order to ensure that no dust nuisance occurs at sensitive receptors during dry and windy spells, a series of measures will be implemented through the CEMP:

- On site roads shall be regularly cleaned and maintained as appropriate.
- Hard surface roads shall be swept to remove mud and aggregate materials from their surface as a result of the development.

- Any un-surfaced roads shall be restricted to essential site traffic only.
- Furthermore, any on site road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during extended dry and/or windy conditions.
- Vehicles using site roads shall have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road and on hard surfaced roads speed shall be restricted to 20 km per hour.
- Vehicles delivering material with dust potential (soil, aggregates) will be enclosed to restrict the escape of dust.
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind. Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods.
- At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the subject site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.
- In relation to the completion of the proposed development, the hard standing surface, and all roads will be tarmacadamed/concreted where applicable. In periods of dry weather when dust emission would be greatest, a road sweeper, which would also dampen the road, will be employed as required to prevent the generation of dust.
- In terms of good practice construction vehicles and equipment will receive regular maintenance. Technical inspection will be performed of vehicles to ensure they will perform most efficiently. A Traffic Management Plan will be implemented to minimise congestion.

13.5.1.2 Climate

GHG Emissions

Construction stage traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the construction phase of the proposed development. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to the temporary nature of these works, the effect on climate will not be significant. Nevertheless, below are some site-specific mitigation measures that will be implemented during the construction phase of the proposed development to ensure emissions are reduced further;

- The prevention of on-site or delivery vehicles from leaving engines idling (even over short periods),
- Minimising waste of materials due to poor timing or over ordering on site (to minimise the embodied carbon footprint of the site).
- Ensure regular maintenance of plant and equipment. Carry out periodic technical inspection of vehicles to ensure they perform most efficiently.
- Implementation of the Traffic Management Plan to minimise congestion; and
- Construction personnel will be encouraged to carpool.

13.5.2 Operational Phase

13.5.2.1 Air Quality

No additional mitigation measures are required during the operational phase of the proposed development, which is expected to have an imperceptible effect on ambient air quality and climate.

13.5.2.2 Climate

GHG Emissions

The increase from traffic is not expected to significantly effect local or global climate trends.

EV charging points will be installed on site and therefore cater for visitors with electric cars. There will be parking provided for bikes and provision will be made for a local link bus to access the site.

Effect of Climate Change on the Proposed Development

Climate Effect Mitigation Measures will be incorporated by design to prevent effects of climate change:

The proposed development will be constructed in accordance with Building Regulations. Only sustainable materials which can perform in longevity and are resistant to changes in temperature will be chosen.

The accommodation and hotel facilities will incorporate effective cooling systems such as air conditioning to maintain comfortable indoor temperatures during periods of increased temperature.

The proposed development will be structurally designed for snow/ice loading and braced effectively to withstand wind in accordance with modern building regulations and design standards.

The floor levels of the proposed development are designed at an elevation to mitigate against flood risk.

The structural design of the proposed development is designed to carry snow loads, in accordance with modern building regulations and design standards.

The structural design of the proposed development will incorporate elements to mitigate against wind damage.

The proposed hotel will utlise landscaping and vegetation strategically to help mitigate storm damage. For example, planting windbreaks or using native vegetation can help reduce erosion and stabilize soil during storms.

An adaption plan will be implemented during the low season and during inclement weather, hotel management will close the whole development or the use of mobile homes, lodges and glamping pods/hobbit huts and camping facilities during storm events, if considered necessary.

Hotel management will advise visitors on the safety of visiting the hotel according to weather forecasts and will take the below guidance from Met Eireann into account. Met Eireann predicts weather events and rates storms in terms of yellow, orange or red as below.

"A status yellow weather alert is given to warn those at risk from certain weather because of their location and/or their activity. It advises these people to take preventative action. Expected weather conditions in a status yellow alert do not pose an immediate risk to the general population."

"A status orange weather warning is given before expected weather conditions that could significantly effect people, property and activity in an area. People in the affected areas should prepare appropriately now for the anticipated conditions."

"A status red severe weather warning is rarely issued but when it is, people in the areas expected to be affected should take action to protect themselves and/or their properties."

To mitigate against major storm effects, hotels will prioritise guest safety and provide good communication prior to scheduled bookings.

13.6 Monitoring

13.6.1 Construction Phase

With respect to monitoring measures temporary dust deposition monitoring will be carried out at the facility during construction phase of the project in order to ensure the boundary levels of deposition and nuisance dust are within recommended limit which are typically less than 350 $mg/m^2/day$.

13.6.2 Operational Phase

No monitoring measures are required for air quality and climate during the operational phase of the proposed development.

13.7 Residual Effects

There will be no significant effects on air quality and climate as a result of the proposed development construction and operational phase, provided that mitigation measures are applied. **Table 13-38** shows residual effects to air quality and climate post mitigation.

Table 13-38 Air quality and Climate Residual Effects

EFFECT (PRE-MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (POST-MITIGATION)					
		QUALITY OF EFFECT	SIGNIFICANCE	SPATIAL EXTENT	DURATION	OTHER RELEVANT CRITERIA	LIKELIHOOD
CONSTRUCTION							
Construction Effect 1: Dust Emissions on Sensitive Receptors (Dust Soiling)	See Section 13.5.1	Negative	Imperceptible	Local	Temporary to Short-Term	Direct	Likely
Construction Effect 1: Dust Emissions on Sensitive Receptors (Human Health)		Negative	Imperceptible	Local	Temporary to Short-Term	Direct	Likely
Construction Effect 1: Dust Emissions on Sensitive Receptors (Ecological)		Negative	Imperceptible	Local	Temporary to Short-Term	Direct	Likely
Construction Effect 2: Traffic Emissions Effect on Air Quality		Negative	Imperceptible	Local	Temporary to Short-Term	Direct	Likely
Construction Effect 3: GHG Emissions on Climate		Neutral	Imperceptible	Extensive	Temporary to Short-Term	Direct	Likely
OPERATIONAL							
Operation Effect 1: Traffic Emissions Effect on Air Quality	See Section 13.5.2	Negative	Imperceptible	Local	Long-term	Direct	Likely
Operation Effect 2: Traffic Emissions Air Quality Effects on Designated Sites		Neutral	Imperceptible	Local	Long-term	Direct	Likely
Operation Effect 3: GHG Emissions Effect on Climate		Negative	Imperceptible	Extensive	Long Term	Direct	Likely

EFFECT (PRE-MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (POST-MITIGATION)					
		QUALITY OF EFFECT	SIGNIFICANCE	SPATIAL EXTENT	DURATION	OTHER RELEVANT CRITERIA	LIKELIHOOD
Operation Effect 4: Flood Risk and Rising Sea Levels		Neutral	Imperceptible	Local	Long Term	Direct	Likely
Operation Effect 5: Coastal Erosion		Neutral	Imperceptible	Local	Long Term	Direct	Likely
Operation Effect 6: Increased Temperatures on Proposed Development Infrastructure and Business		Neutral	Imperceptible	Local	Temporary (occurring rarely)	Direct	Likely
Operation Effect 7: Increased Temperatures on Proposed Development Visitors/Employees		Negative	Imperceptible	Local	Temporary (occurring rarely)	Direct	Unlikely
Operation Effect 8: Ice or Snow Effects on Proposed Development/Employees		Negative	Imperceptible	Local	Temporary (occurring rarely)	Direct =	Unlikely
Operation Effect 9: Major Storm Damage Effects On Proposed Development and Business		Negative	Not significant	Local	Temporary	Direct	Likely
Operation Effect 10: Major Storm Damage Effects On Proposed Development Visitors/Employees		Negative	Not significant	Local	Temporary	Direct	Likely

13.8 Summary

The Air Quality and Climate assessment has been carried out in line with all relevant guidelines. The proposed subject site has been designed to ensure that there are no significant negative effects on air quality.

The assessment concludes that operation of the subject site will have imperceptible effects on air quality and the health of local people.

Application of an Environmental Management System will incorporate best practice measures in order to minimise dust and air pollutants at the subject site. During the construction and operational phase, emissions to air from the construction, landscaping and operation of the process will be regulated in accordance with specific conditions set out within the EIAR.

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