

RECEIVED: 02/10/2025

Kildare County Council - Inspection Purposes Only

CHAPTER 10

AIR QUALITY

10.0 AIR QUALITY

10.1 INTRODUCTION

This chapter of the EIAR describes and assesses the potential impacts on air quality associated with the Proposed Development.

Taking into account Ambient Air Quality Standards¹, the baseline air quality was examined along with the potential for release of emissions to the atmosphere and associated effects prior to and following mitigation measures.

10.1.1 Quality Assurance and Competence

This chapter was prepared by Laura Griffin, Environmental Consultant, DNV. Laura has a Master of Science (Hons) degree in Climate Change from Maynooth University and a Bachelor of Arts (Hons) degree in English and Geography from Maynooth University. Laura has 5+ years of professional experience and has worked as an Environmental Consultant with DNV since 2021 and has experience preparing Environmental Impact Assessment (EIA) Screening Reports, Air Quality and Climate, Noise and Vibration and Material Assets (Waste and Utilities) Chapters of Environmental Impact Assessment Reports (EIAR)s.

This chapter has been reviewed and approved by Catherine Keogan, Technical Director and EIA Lead at DNV. Catherine is an environmental consultant with 37 years' experience in consultancy, specialising in EIAs for large-scale residential, commercial developments, pharmaceutical, BESS and solar projects working closely with a range of developers, planning consultants and architects within the public and private sector. Catherine has a B.Sc. (Hons) in Analytical Science and a Post Graduate Diploma in Renewable Energy Technology Systems.

10.2 STUDY METHODOLOGY

This study methodology is in line with accepted practices. Taking into account Ambient Air Quality Standards, the baseline air quality of the site is examined using EPA monitoring data. Air quality impacts from the proposed development are then determined by a qualitative assessment of the nature and scale of dust and emission generating activities associated with the Construction Phase of the proposed development in accordance with relevant guidance (Institute of Air Quality Management (IAQM) 2024).

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the Proposed Development. The scoping criteria detailed in 10.2.2 has been used to determine if any road links are affected by the Proposed Development and require an air quality assessment.

10.2.1 Relevant Legislation and Guidance

The principal guidance and best practice documents used to inform the assessment of potential impacts on air quality is as follows:

¹ Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) Irish Statute Book.

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government (DHP&LG), 2018);
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the Environmental Protection Agency (EPA) Guidelines) (EPA, 2022);
- Guidance on the Assessment of Dust from Demolition and Construction Version 2.2 (Institute of Air Quality Management (IAQM), 2024);
- A Guide To The Assessment Of Air Quality Impacts On Designated Nature Conservation Sites (Version 1.1) (IAQM, 2020);
- TII Guidance Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 and TII Road Emissions Model (REM) online calculator tool (TII, 2022); and
- TII Road Emissions Model (REM): Model Development Report – GE-ENV-01107 (TII, 2024).

10.2.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, National and European statutory bodies, the Department of the Environment, Heritage and Local Government in Ireland (DEHLG, 2004) and the European Parliament and Council of the European Union, have set limit values in ambient air for a range of air pollutants. These limit values or ‘*Air Quality Standards*’ are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set.

Air quality significance criteria are assessed based on compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2022, which incorporate European Commission Directive 2008/50/EC, which has set limit values for numerous pollutants with the limit values for NO₂, PM₁₀, and PM_{2.5} being relevant to this assessment. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC) and includes ambient limit values relating to PM_{2.5}. The applicable limit values for NO₂, PM₁₀, and PM_{2.5} are set out in Table 10.1.

Table 10.1: Ambient Air Quality Standards and TA Luft

Pollutant	Regulation ²	Limit Type	Value
Dust Deposition	TA Luft (German VDI, 2002)	Annual average limit for nuisance dust	350 mg/m ² /day
Nitrogen Dioxide	2008/50/EC	Annual average limit for nuisance dust	200 µg/m ³
		Annual limit for protection of human health	40 µg/m ³
NOx	2008/50/EC	Annual limit for the protection of vegetation	30 µg/m ³
Particulate Matter (as PM ₁₀)	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m ³ PM ₁₀
		Annual limit for protection of human health	40 µg/m ³ PM ₁₀

² EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

Pollutant	Regulation ²	Limit Type	Value
Particulate Matter (as PM _{2.5}) – Stage 1	2008/50/EC	Annual limit for protection of human health	25 µg/m ³ PM _{2.5}
Particulate Matter (as PM _{2.5}) – Stage 2 ³	2008/50/EC	Annual limit for protection of human health	20 µg/m ³ PM _{2.5}

On the 14th of October 2024 the European Parliament and the Council adopted a directive setting updated air quality standards across the EU. The directive aims to improve air quality across the EU by aligning standards with the latest World Health Organisation (WHO) guidelines and reducing air pollution's health impacts by more than 55% by 2030. The directive updates and consolidates previous directives (2004/107/EC and 2008/50/EC) to enhance clarity and effectiveness. This plan is part of the broader European Green Deal, targeting significant reductions in air, water, and soil pollution by 2050. The revised directive will also ensure early action, with air quality roadmaps that need to be prepared ahead of 2030 if there is a risk that the new standards will not be attained by that date. The air quality standards will be reviewed regularly in line with latest scientific evidence to assess whether they continue to be appropriate.

The text will be published in the EU's Official Journal and enter into force on the twentieth day following publication. Member states will have two years after the entry into force to transpose the directive into national law.

By 2030, the European Commission will review the air quality standards and every five years thereafter, in line with latest scientific evidence.

At present, the applicable standards for assessing compliance in relation to air quality are those outlined in Table 10.1.

10.2.1.2 Air Quality and Traffic Impact Significance Criteria

The TII document *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022) details a methodology for determining air quality impact significance criteria for road schemes which can be applied to any project that causes a change in traffic. The degree of impact is determined based on the percentage change in pollutant concentrations relative to the 'Do Nothing' scenario. The TII significance criteria are outlined in Table 4.9 of *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022) and reproduced in Table 10.2. These criteria have been adopted for the proposed development to predict the effect of NO₂, PM₁₀ and PM_{2.5} emissions as a result of the proposed development.

Table 10.2: Dust Emission Magnitude for the site

Long Term Average Concentration at Receptor in Assessment Year	% Change in Concentration Relative to Air Quality Limit Value (AQLV)			
	1%	2-5%	6-10%	>10%
75% or less of AQLV	Neutral	Neutral	Slight	Moderate
76-94% of AQLV	Neutral	Slight	Moderate	Moderate
95%-102% of AQLV	Slight	Moderate	Moderate	Substantial
103-109% of AQLV	Moderate	Moderate	Substantial	Substantial

³ Stage 2 Indicative limit value for PM_{2.5} to be applied from 1 January 2020 after review by the European Commission

Long Term Average Concentration at Receptor in Assessment Year	% Change in Concentration Relative to Air Quality Limit Value (AQLV)			
	1%	2-5%	6-10%	>10%
110% or more of AQLV	Moderate	Substantial	Substantial	Substantial

Source: Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022)

10.2.2 Construction Phase

10.2.2.1 Construction Phase Dust Impact Assessment

The main air quality impacts that may arise during demolition and construction activities are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;
- Elevated PM₁₀, PM_{2.5} concentrations from demolition and construction activities (including earthworks and trackout); and
- An increase in concentrations of PM₁₀, PM_{2.5} and nitrogen dioxide due to exhaust emissions from vehicles and equipment used on site (non-road mobile machinery) and vehicles accessing the site.

The risk of dust emissions from a demolition/construction site causing loss of amenity and/or health or ecological impacts (and effects) is related to:

- The activities being undertaken (demolition, number of vehicles and plant etc.);
- The duration of these activities; the size of the site;
- The meteorological conditions (wind speed, direction and rainfall);
- The proximity of receptors to the activities;
- The adequacy of the mitigation measures applied to reduce or eliminate dust; and
- The sensitivity of the receptors to dust.

A review of Casement Aerodrome meteorological data indicates that the prevailing wind direction is south-westerly, and wind speeds are generally moderate in nature (see Section 10.3.2.2). Moderate to high windspeeds (above 5m/s (7-10 knots)) are most likely to result in fugitive dust emissions. Approximately 32.85% of all hourly data featured winds of below 5m/s. In addition, dust generation is considered negligible on days where rainfall is greater than 0.2mm. A review of historical 30-year average data for Casement Aerodrome indicates that on average 172 days per year will have rainfall over 0.2mm (Met Éireann, 2024) and it can be determined that 47% of the time dust generation will be reduced. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust.

As with any impact, the risk will be determined by the magnitude of the source, the effectiveness of the pathway and the sensitivity of the receptor.

The IAQM Guidance on the Assessment of Dust from Demolition and Construction (2024) provides a framework for the assessment of risk.

Activities on construction sites have been divided into four types:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

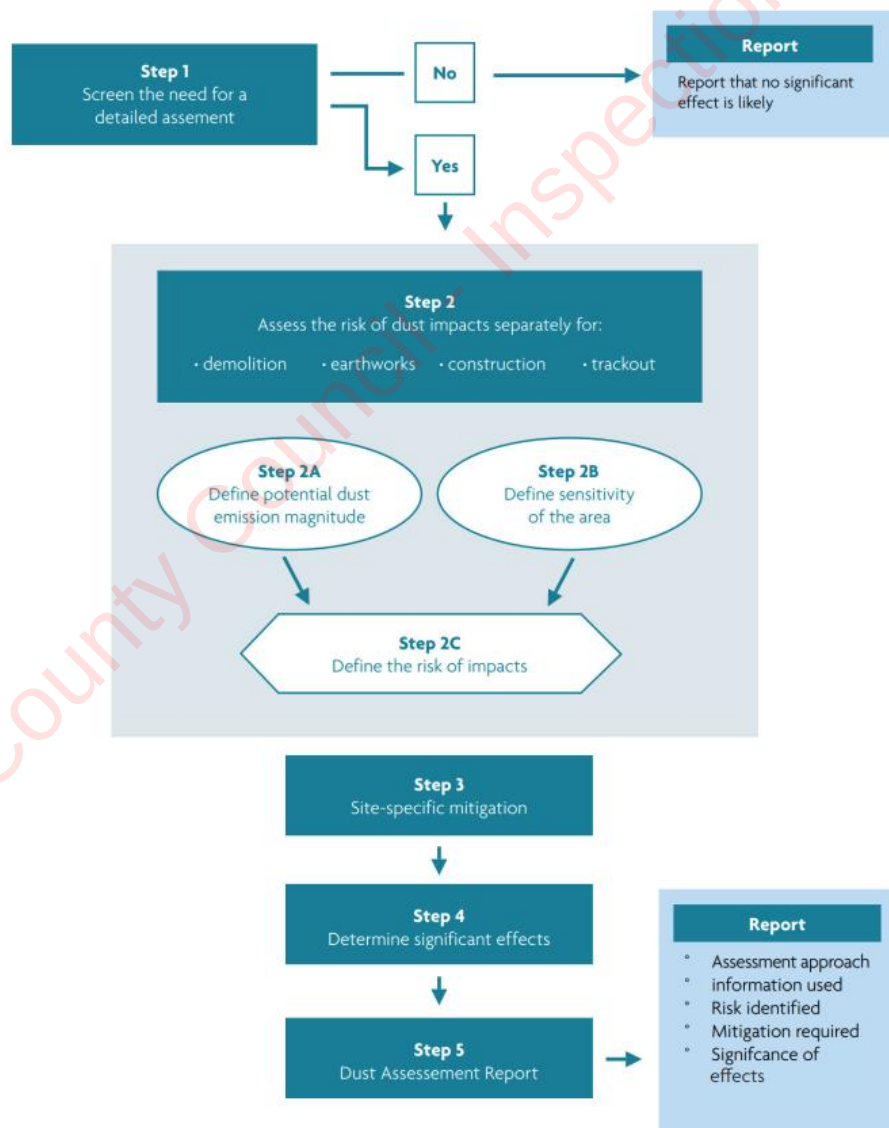
The potential for dust emissions is assessed for each activity that is likely to take place.

The assessment methodology considers three separate dust impacts:

- Annoyance due to dust soiling;
- The risk of health impacts due to an increase in exposure to PM₁₀; and
- Harm to ecological receptors with account being taken of the sensitivity of the area that may experience these effects.

The assessment is used to define appropriate mitigation measures to ensure that there will be no significant impact.

Figure 10.1: Steps to Perform a Dust Assessment (IAQM, 2024)



Step 1 – Screening the Need for a Detailed Assessment

Step 1 is to screen the requirement for a more detailed assessment. An assessment will normally be required where there is:

- A human receptor within:
 - 250m of the boundary of the site; and/or
 - 50m of the route(s) used by the construction vehicles on the public highway, up to 250m from the site entrance(s).
- An 'ecological receptor' within:
 - 50m of the boundary of the site; and/or
 - 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s).

A review of publicly available information indicates that there are no statutory (international or national) ecological receptors within 50m of the site or applicable construction routes.

Step 2 – Assess the Risk of Dust Impacts

Step 2 is to assess the risk of dust impacts. This is carried out separately for each of the activities; as there are no demolition works proposed as part of the Proposed Development, the dust impacts are assessed for the remaining three activities (earthworks; construction; and trackout). According to the IAQM (2024), the risk of dust arising in sufficient quantities to cause annoyance and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high. A site is allocated to a risk category based on two factors:

- The scale and nature of the works, which determines the potential dust emission magnitude as small, medium and large (Step 2A); and
- The sensitivity of the area to dust impacts (Step 2B), which is defined as low, medium or high sensitivity.

These two factors are combined in Step 2C to determine the risk of dust impacts with no mitigation applied. The risk category assigned to the site can be different for each of the three potential activities (earthworks, construction and trackout). More than one of these activities may occur on a site at any one time. Risks are described in terms of there being a low, medium and high risk of dust impacts for each of the three separate potential activities. Where there are low, medium and high risks of an impact, then site-specific mitigation will be required, proportionate to the level of risk.

Step 2A – Define the Potential Dust Emission Magnitude

The dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium or Large.

Earthworks: Earthworks will primarily involve excavating material, haulage, topping and stockpiling. 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 and large based on the definitions from the IAQM guidance:

- Large: Total site area $>110,000\text{m}^2$, 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 $>6\text{m}$ in height;
- Medium: Total site area $18,000\text{m}^2 - 110,000\text{m}^2$, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds $3\text{m} - 6\text{m}$ in height; and
- Small: Total site area $<18,000\text{m}^2$, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds $>3\text{m}$ in height.

The dust emission magnitude for proposed earthwork activities can be classified as large, as the site area is 15.27 hectares.

Construction: The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s)/infrastructure, method of construction, construction materials, and duration of build. The IAQM example definitions for construction are:

- Large: Total building volume $>75,000\text{ m}^3$, on site concrete batching, sandblasting;
- Medium: Total building volume $12,000\text{ m}^3 - 75,000\text{ m}^3$, potentially dusty construction material (e.g. concrete), on site concrete batching; and
- Small: Total building volume $<12,000\text{ m}^3$, construction material with low potential for dust release (e.g. metal cladding or timber).

The total volume of buildings to be constructed is 130183.41 m^3 and therefore the proposed construction can be classified as large.

Trackout: Factors which determine the dust emission magnitude are vehicle size, vehicle speed, vehicle numbers, geology and duration. As with all other potential sources, professional judgement must be applied when classifying trackout into one of the dust emission magnitude categories. IAQM definitions for trackout are:

- Large: >50 HDV ($>3.5\text{t}$) outward movements⁴ in any one day⁵, potentially dusty surface material (e.g. high clay content), unpaved road length $>100\text{m}$;
- Medium: $20-50$ HDV ($>3.5\text{t}$) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length $50\text{m} - 100\text{m}$; and
- Small: <20 HDV (3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length $<50\text{m}$.

These numbers are for vehicles that leave the site after moving over unpaved ground, where they will accumulate mud and dirt that can be tracked out onto the public highway.

As a worst-case scenario, the Proposed Development can be classified as medium.

Table 10.3 provides a summary of the dust emission magnitude for the site.

⁴ A vehicle movement is a one-way journey, i.e., from A to B, and excludes the return journey.

⁵ HDV movements during the construction project vary over its lifetime, and the number of movements is the maximum, not the average.

Table 10.3: Dust Emission Magnitude for the site

Activity	Dust Emission Magnitude
Earthworks	Large
Construction	Large
Trackout	Medium

Step 2B – Define the Sensitivity of the Area

The sensitivity of the area takes account of a number of factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM₁₀, the local background concentration; and
- Site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Sensitivities of People to Dust Soiling Effects

For the sensitivity of people and their property to soiling, the IAQM (2024) recommends that the air quality practitioner uses professional judgment to identify where on the spectrum between high and low the sensitivity of a receptor lies, taking into account the following general principles set out in Table 10.4.

Table 10.4: Sensitivities of People to Dust Soiling Effects (Source: IAQM, 2024)

Sensitivity	Features	Indicative Examples
High	• Users can reasonably expect enjoyment of a high level of amenity; or • The appearance, aesthetics or value of their property would be diminished by soiling; and • The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of the use of the land.	• Dwellings; • Museums and other culturally important collections; and • Medium and long term car parks and show rooms.
Medium	• Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or • The appearance, aesthetics or value of their property could be diminished by soiling; or • The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.	• Parks; and • Places of work.
Low	• The enjoyment of amenity would not reasonably be expected; or	• Playing fields; • Farmland (unless commercially sensitive horticultural); • Footpaths;

Sensitivity	Features	Indicative Examples
	- Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or - There is a transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use for the land.	- Short-term carparks⁶ - Places of work.

Sensitivities of People to Health Effects of PM₁₀

For the sensitivity of people to the health effects of PM₁₀, the IAQM (2024) recommends that the air quality practitioner assumes that there are three sensitivities based on whether or not the receptor is likely to be exposed to elevated concentrations over a 24-hour period, consistent with the Defra's advice for local air quality management, Defra LAQM Technical Guidance LAQM.TG (2022).

Table 10.5: Sensitivities of People to the Health Effects of PM₁₀ (Source: IAQM, 2024)

Sensitivity	Features	Indicative Examples
High	Locations where members of the public are exposed over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day)⁷.	- Residential properties; - Hospitals; - Schools; and - Residential care homes.
Medium	Locations where the people exposed are workers⁸, and exposure is over a time period relevant to the air quality objective for PM₁₀ (in the case of 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).	Office and shop owners. (Workers occupationally exposed to PM₁₀ are generally not included as protection is covered by Health and Safety at Work Legislation)
Low	Locations where human exposure is transient⁹.	- Public footpaths; - Playing fields; and - Shopping streets.

⁶ Car parks have a range of sensitivities depending on the duration and frequency that people would be expected to park their cars there, and the level of amenity they could reasonably expect whilst doing so. Car parks associated with workplace or residential parking might have a high level of sensitivity compared to car parks used less frequently and for shorter durations, such as those associated with shopping. Cases should be examined on their own merits.

⁷ This follows Defra guidance as set out in LAQM.TG (2022)

⁸ Notwithstanding the fact that the air quality objectives and limit values do not apply to people in the workplace, such people can be affected by the exposure of PM₁₀. However, they are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children are not normally workers. For this reason, workers have been included in the medium sensitivity category.

⁹ There are no standards that apply to short-term exposure, e.g. one or two hours, but there is still a risk of health impacts, albeit less certain.

Table 10.4 and Table 10.5 illustrate how the sensitivity of the area may be determined for dust soiling and human health impacts, respectively. It should be noted that the highest level of sensitivity from each table should be considered, as recommended by the IAQM.

The criteria detailed in Table 10.6 and Table 10.7 were used to determine the sensitivity of the area to dust soiling effects and human health impacts.

Table 10.6: Sensitivity of Dust Soiling Effects on People and Property

Receiver Sensitivity	Number of Receivers	Distance from the Source (m)			
		<20m	<50m	<100m	<250m
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

Table 10.7: Sensitivity of the Area to Human Health Impacts

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

Step 2C – Define the Risk of Impacts

In accordance with the IAQM Guidance, the dust emission magnitude (Step 2A) and sensitivity of the area (Step 2B) have been combined and the risk of impacts from construction, earthworks and trackout have determined (before mitigation is applied).

Table 10.8 to 10.10 illustrate how the dust emission magnitude should be combined with the sensitivity of the area to determine the risk with no mitigation measures applied.

Table 10.8: Risk of Dust – Earthworks

Potential Impact	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 10.9: Risk of Dust – Construction

Potential Impact	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 10.10: Risk of Dust – Trackout

Potential Impact	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

The risk of dust impacts is based on the potential dust emissions magnitude and the sensitivity of the area. These two factors are then combined to determine the risk of dust impacts with no mitigation applied. In the absence of any site-specific information, a higher risk category has been applied to represent a worst-case scenario.

The risk of dust soiling and the impact on human health before mitigation, is summarised in Section 10.5.1.1.

10.2.2.2 Construction Phase Traffic Emissions

Construction phase traffic has the potential to affect air quality. The TII guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022), states that 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. While the guidance is specific to infrastructure projects the approach can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- Daily average speed change by 10 kph or more;
- Peak hour speed change by 20 kph or more; or
- A change in road alignment by 5m or greater.

The construction stage traffic will not change by more 1,000 AADT or 200 HDV AADT and does not meet the above scoping criteria. In addition, there are no proposed changes to the traffic speeds or road alignment. As a result, a detailed air assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to air quality.

10.2.3 Operational Phase

Operational phase traffic has the potential to affect local air quality as a result of increased vehicle movements associated with the Proposed Development. The TII scoping criteria detailed in Section 10.2.2.2 were used to determine if any road links are affected by the Proposed Development and require inclusion in a detailed air quality modelling assessment. The Proposed Development will result in the operational phase traffic increasing by more than 1,000 AADT on two road links. Therefore, a detailed air quality modelling assessment of operational phase traffic emissions was conducted.

The impact to air quality due to changes in traffic is assessed at sensitive receptors in the vicinity of affected roads. The receptor locations are discussed in further detail within Section 10.2.3.1.2.

The TII guidance (TII, 2022) states that modelling should be conducted for NO₂, PM₁₀ and PM_{2.5} for the Base, Opening and Design Years for both the Do Minimum (Do Nothing) and Do Something scenarios. Modelling of operational NO₂, PM₁₀ and PM_{2.5} concentrations has been conducted for the Do Nothing and Do Something scenarios using the TII Road Emissions Model (REM) online calculator tool (TII, 2025). The following inputs are required for the REM tool:

- Receptor locations;
- Light duty vehicle (LDV) annual average daily traffic movements (AADT);
- Annual average daily heavy duty vehicles (HDV AADT);
- Annual average traffic speeds;
- Road link lengths;
- Road type;
- Project county location; and
- Pollutant background concentrations.

The *Default* fleet mix option was selected along with the *Intermediate Case* fleet data base selection, as per TII Guidance (TII, 2024). The *Intermediate Case* assumes a linear interpolation between the *Business as Usual* case, where current trends in vehicle ownership continue and the *Climate Action Plan (CAP)* case, where adoption of low emission light duty vehicles occurs.

Using this input data, the model predicts the road traffic contribution to ambient ground level concentrations at the identified sensitive receptors using generic meteorological data. The TII REM uses county-based Irish fleet composition for different road types, for different European emission standards from pre-Euro to Euro 6/VI with scaling factors to reflect improvements in fuel quality, retrofitting, and technology conversions. The TII REM also includes emission factors for PM₁₀ emissions associated with brake and tire wear (TII, 2024). The predicted road contributions are then added to the existing background concentrations to give the predicted ambient concentrations. The ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the proposed development with these ambient air quality standards.

10.2.3.1 Traffic Data used in Modelling Assessment

Traffic flow information was obtained from Roughan and O'Donovan (ROD) (2025) for the purposes of this assessment. A full copy of the annual average daily traffic (AADT) generated during the operational phase of the Proposed Development can be found in Appendix 10.1. Two different year scenarios are

presented in Table 10.11 for the operational phase vehicle trip generation data. The ‘Do Nothing’ and ‘Do Something’ scenarios for the Opening Year (2028) and Design Year (2043) (which is Opening Year plus 15 years, as per TII Guidance). These scenarios have been used to assess the potential traffic-related impacts of the Proposed Development during its operational phase.

The traffic data are detailed in Table 10.11 two road links met the TII scoping criteria and were within 200m of receptors therefore, these links were included in the modelling assessment. Background concentrations have been included as per Section 10.3.1 of this chapter based on available EPA background monitoring data (EPA, 2025).

Table 10.11: Traffic Data Used in Air Modelling Assessment

Link Number	Road Name	Opening Year (2028)		Design Year (2043)		Speed (Km/h)
		Do Nothing	Do Something	Do Nothing	Do Something	
		AADT	AADT	AADT	AADT	
1	R405	6,934 (3% HGV)	9,128 (2% HGV)	7,149 (3% HGV)	9,128 (2% HGV)	80
2	R148	9,885 (3% HGV)	11,839 (3% HGV)	10,270 (3% HGV)	12,104 (3% HGV)	80

10.2.3.1.2 Sensitive Receptors

The impact to air quality as a result of changes in traffic is assessed at sensitive receptors in the vicinity of affected roads. The TII guidance (TII, 2022) states a proportionate number of representative receptors which are located in areas which will experience the highest concentrations or greatest improvements as a result of the proposed development are to be included in the modelling. The TII criteria state that receptors within 200m of affected road links should be assessed; roads which are greater than 200m from receptors will not affect pollutant concentrations at that receptor. The TII guidance (TII, 2022) defines sensitive receptor for the purposes of modelling annual mean pollutant concentrations as residential housing, schools, hospitals, care homes and short term-accommodation such as hotels, i.e. locations where members of the public are likely to be regularly present for 24 hours.

For the purpose of determining local air quality impacts, four receptors were included in this modelling assessment and has been identified. The receptors modelled will represent the worst-case location in the vicinity the Proposed Development and was chosen based on proximity (within 200m) to the road links affected by the Proposed Development:

Table 10.12: Sensitive Receptors

Name	Type	ITM Coordinates	
		X	Y
R1	Residential	694607	737780
R2	Residential	695021	737707
R3	Residential	694008	737004
R4	Residential	694926	736258

10.2.3.1.3 Air Quality Impacts on Sensitive Ecology

In addition to assessing the impact to people as a result of air quality, the impact to sensitive ecosystems must also be assessed as per the TII guidelines (TII, 2022; 2024). The EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the '*Habitats Directive*') requires an Appropriate Assessment to be carried out where there is likely to be a significant impact upon a European protected site. TII requires the Air Quality Specialist to liaise with an ecologist on schemes where there is a European protected site within 2km of the proposed development site. However, as the potential impact of a scheme is limited to local level, detailed consideration need only be given to roads where there is a significant change to traffic flows and the designated site lies within 200m of the road centre line. Where these two requirements are fulfilled, the assessment involves a calculation of nitrogen oxides (NO_x) and ammonia (NH₃) concentrations to determine the N deposition and acid deposition rates using the methodology set out in TII Guidance document PE-ENV-01106 (TII, 2022).

Sections of the Rye Water Valley/Cartron SAC (Site Code 001398) are within 200m of a road link (R148) impacted by the Proposed Development. Therefore, an assessment of air quality impacts to ecology was carried out within sections of these sites closest to the impacted roads.

The TII REM was used to calculate the NO_x and NH₃ concentrations and N deposition and acid deposition rates within the sections of the identified ecological sites that are within closest proximity to the road alignments. Pollutant concentrations will be greatest closest to the road, with concentrations decreasing with increased distance from the road. Therefore, by assessing the impact at the point within the designated site that is closest to the road, the worst-case impact can be determined. The inputs into the REM are the same as those outlined for the local air quality assessment. Modelling of the Opening Year 2028 and the Design Year 2043 was conducted for both the Do Nothing and Do Something scenarios in order to determine the degree of change in air quality.

Impacts in relation to NO_x concentrations were compared against the annual mean ambient air quality standard of 30 µg/m³ for the protection of ecology. Impacts in relation to NH₃ concentrations were compared against the annual mean limit value of 3 µg/m³. The impact of N and acid deposition were assessed using the criteria in Table 10.13 which are based on Table 3.24 of PE-ENV-01107.

Background NO_x and NH₃ concentrations as well as background N deposition and acid deposition rates for the area of the Rye Valley/Cartron SAC within the study area were determined using the Air Pollution Information System (APIS) web GIS based portal (CEH, 2022). The APIS site was also used to determine the relevant critical loads for various habitat types within the designated sites. The critical loads for the sensitive habitat types within the designated sites are detailed in Table 10.14. The critical load ranges for the most sensitive habitat or species were used in the current assessment as a conservative approach regardless of whether the sensitive habitat or species was present in the impacted location.

Table 10.13: Significance of Effects at Sensitive Designated Habitats

Description of Results	Significance
Total N deposition and acid deposition are more than 1% of the critical load.	Discuss further with project biodiversity practitioners
The total N deposition and acid deposition are less than 1% of the critical load.	Not significant

Source: PE-ENV-01107 Air Quality Assessment Standard for Proposed National Roads, Table 3.24 (TII, 2024).

Table 10.14: Critical Load

Pollutant	Designated Site	Critical Load Range
N Deposition	Rye Valley/Carlton SAC	5-10 kg N/ha/yr
Acid Deposition	Rye Valley/Carlton SAC	0.1-0.5 keq/ha/year

The modelling results are discussed in Section 10.5 of this chapter.

10.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

10.3.1 Air Quality

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 2023*” (EPA, 2024). 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 (EPA, 2025).

As part of the implementation of the Framework Directive on Air Quality (1996/62/EC, four air quality zones have been defined in Ireland by the EPA for air quality management and assessment purposes. The main areas defined in each zone are:

- ❖ **Zone A:** Dublin Conurbation
- ❖ **Zone B:** Cork Conurbation
- ❖ **Zone C:** Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise.
- ❖ **Zone D:** Rural Ireland, i.e., the remainder of the State excluding Zones A, B and C.

The site is located in Maynooth, Co. Kildare and falls under the ‘Zone D’, which is described by the EPA as ‘Rural Ireland’. It is expected that existing ambient air quality in the vicinity of the site is characteristic of a rural location with the primary source air emissions (such as particulate matter (dust), NO₂, and hydrocarbons) likely to be of local domestic and agricultural origin. Local agricultural activities may exert a higher or lower influence on dust generation in the vicinity of the site on a seasonal basis. The site is in close proximity to Leixlip monitoring station (ca 5.6km from Leixlip monitoring station) which falls into ‘Zone C’ and therefore, ‘Zone C’ is considered to be more representative of the conditions experienced at the site. ‘Zone C’ of Ireland which is described by the EPA as ‘Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise’. It is expected that existing ambient air quality in the vicinity of the Site is characteristic of a suburban location with the primary source of air emissions such as particulate matter, NO₂, and hydrocarbons likely to be of traffic and domestic fuel burning.

The EPA launched a national air quality forecast in November 2023, to provide greater information to the public regarding expected air quality in Ireland for up to three days - “Today”, “Tomorrow” and the “Day after Tomorrow”.

Forecasts include daily Air Quality Index for Health (AQIH), Particulate Matter (PM), nitrogen dioxide (NO₂) and ozone (O₃). PM, NO₂ and O₃ are the three main air pollutants impacting human health in Ireland. All pollutants mapped are presented on the Air Quality Index for Health (AQIH) scale (1 – 10). The forecast maps are uploaded twice daily, once in the morning and once in the evening.

In conjunction with individual local authorities, the EPA undertakes ambient air quality monitoring at specific locations throughout the country in the urban and rural environment; an Air Quality Report based on data from monitoring stations and a number of mobile air quality units is developed on an annual basis. The EPA's most recent publication 'Air Quality in Ireland, 2023' reports the quality of the air in Ireland based on the data from the National Ambient Air Quality Monitoring Network throughout the year 2023 (EPA, 2024).

Table 10.15: Concentrations of NO₂ at Zone C Monitoring Stations

Station	Objective	Concentration (µg/m ³)		Limit or Threshold Value
		2022	2023	
Meath Navan	Annual Mean NO ₂ ¹⁰	21.0	22.2	40 µg/m ³
	Days >200µg/m ³	0	0	35 days
Waterford Brownes Road	Annual Mean NO ₂	7.3	6.9	40 µg/m ³
	Days >200µg/m ³	0	0	35 days
Waterford Port	Annual Mean NO ₂	-	18.3	40 µg/m ³
	Days >200µg/m ³	-	2	35 days
Sligo ¹¹	Annual Mean NO ₂	-	-	40 µg/m ³
	Days >200µg/m ³	-	-	35 days
Limerick Henry Street	Annual Mean NO ₂	15.2	13.5	40 µg/m ³
	Days >200µg/m ³	0	0	35 days
Limerick People's Park	Annual Mean NO ₂	-	9.0	40 µg/m ³
	Days >200µg/m ³	-	0	35 days
Kilkenny Seville Lodge	Annual Mean NO ₂	4.8	4.4	40 µg/m ³
	Days >200µg/m ³	0	0	35 days
Portlaoise	Annual Mean NO ₂	9.0	8.3	40 µg/m ³
	Days >200µg/m ³	0	0	35 days
Dundalk	Annual Mean NO ₂	10.4	9.3	40 µg/m ³
	Days >200µg/m ³	1	1	35 days
Galway Eyre Square	Annual Mean NO ₂	17.6	16.9	40 µg/m ³
	Days >200µg/m ³	0	0	35 days

Based on the data summarised in Table 10.15, existing baseline air quality for the area in which the site is located be characterised as being of good quality with no exceedances of the Air Quality Regulations limit values of specific pollutants. The results show that current levels of NO₂ are well below the annual mean and 1-hour maximum limit values. In the year 2022, annual mean concentrations of NO₂ ranged from 4.8 – 21.0 µg/m³ across all Zone C stations, with no exceedance of the maximum hourly limit (EPA, 2023). In the year 2023, annual mean concentrations of NO₂ ranged from 4.4 – 22.2 µg/m³ across all Zone C stations, with no exceedance of the maximum hourly limit (EPA, 2024).

¹⁰ NO₂ annual mean limit value for the protection of human health: 40 µg/m³ per station

¹¹ There is no data for Sligo in 2022 and 2023 due to operational issues

The average concentration of NO₂ in 2023 was 12.1 µg/m³. EPA 2023 background concentrations have been used in combination with correction factors to estimate annual average NO₂ concentrations in the region of the Proposed Development for the base year (2024). These factors have been adapted from DEFRA roadside NO₂ projection factors. Based on these correction factors, the estimated base year (2024) NO₂ concentration in the region of the Proposed Development is 11.4 µg/m³.

Measured concentrations of PM₁₀ for the years 2022 and 2023 are presented in Table 10.16 for Zone C monitoring stations.

Table 10.16: Concentrations of PM₁₀ at Zone C Monitoring Stations

Station	Objective	Concentration (µg/m ³)		Limit or Threshold Value
		2022	2023	
Portlaoise	Annual Mean PM ₁₀ ¹²	12.0	11.0	40 µg/m ³
	Days >50µg/m ³ ¹³	0	0	35 days
Ennis	Annual Mean PM ₁₀	20.0	16.4	40 µg/m ³
	Days >50µg/m ³	21	11	35 days
Sligo ¹⁴	Annual Mean PM ₁₀	-	-	40 µg/m ³
	Days >50µg/m ³	-	-	35 days
Galway Ragoon	Annual Mean PM ₁₀	12.6	12.7	40 µg/m ³
	Days >50µg/m ³	0	0	35 days
Galway Briarhill	Annual Mean PM ₁₀	14.2	12.1	40 µg/m ³
	Days >50µg/m ³	0	0	35 days
Ballinasloe ¹⁵	Annual Mean PM ₁₀	-	13.7	40 µg/m ³
	Days >50µg/m ³	-	1	35 days
Clonmel	Annual Mean PM ₁₀	11.0	9.3	40 µg/m ³
	Days >50µg/m ³	1	1	35 days
Claremorris	Annual Mean PM ₁₀	7.9	8.1	40 µg/m ³
	Days >50µg/m ³	0	0	35 days
Dundalk	Annual Mean PM ₁₀	12.3	13.2	40 µg/m ³
	Days >50µg/m ³	2	1	35 days
Carlow Town	Annual Mean PM ₁₀	11.3	10.1	40 µg/m ³
	Days >50µg/m ³	0	0	35 days
Waterford Brownes Road	Annual Mean PM ₁₀	15.2	12.2	40 µg/m ³
	Days >50µg/m ³	3	1	35 days
Waterford Port	Annual Mean PM ₁₀	-	14.0	40 µg/m ³
	Days >50µg/m ³	-	3	35 days
Navan	Annual Mean PM ₁₀	14.2	13.2	40 µg/m ³
	Days >50µg/m ³	1	0	35 days
Kilkenny Seville Lodge	Annual Mean PM ₁₀	17.5	13.9	40 µg/m ³
	Days >50µg/m ³	2	0	35 days
Letterkenny	Annual Mean PM ₁₀	14.2	13.4	40 µg/m ³
	Days >50µg/m ³	6	3	35 days
Wexford Town	Annual Mean PM ₁₀	14.5	12.7	40 µg/m ³
	Days >50µg/m ³	5	1	35 days
Limerick Henry Street	Annual Mean PM ₁₀	13.9	11.3	40 µg/m ³
	Days >50µg/m ³	2	0	35 days

¹² PM₁₀ annual mean limit value for the protection of human health: 40 µg/m³ per station

¹³ PM₁₀ daily limit for the protection of human health: No more than 35 days in a year >50 µg/m³ per station

¹⁴ There is no data for Sligo for 2022 or 2023 due to operational issues

¹⁵ Station newly added in 2023, therefore low data capture for Ballinasloe in 2023

Station	Objective	Concentration ($\mu\text{g}/\text{m}^3$)		Limit or Threshold Value
		2022	2023	
Limerick People's Park	Annual Mean PM_{10}	13.9	11.4	$40 \mu\text{g}/\text{m}^3$
	Days $>50\mu\text{g}/\text{m}^3$	2	0	35 days
Athlone	Annual Mean PM_{10}	12.3	11.6	$40 \mu\text{g}/\text{m}^3$
	Days $>50\mu\text{g}/\text{m}^3$	3	1	35 days
Tralee	Annual Mean PM_{10}	17.9	14.5	$40 \mu\text{g}/\text{m}^3$
	Days $>50\mu\text{g}/\text{m}^3$	14	2	35 days
Drogheda	Annual Mean PM_{10}	11.9	10.9	$40 \mu\text{g}/\text{m}^3$
	Days $>50\mu\text{g}/\text{m}^3$	0	0	35 days
Naas	Annual Mean PM_{10}	12.3	10.9	$40 \mu\text{g}/\text{m}^3$
	Days $>50\mu\text{g}/\text{m}^3$	2	1	35 days
Greystones	Annual Mean PM_{10}	11.6	10.7	$40 \mu\text{g}/\text{m}^3$
	Days $>50\mu\text{g}/\text{m}^3$	0	0	35 days
Bray	Annual Mean PM_{10}	10.0	10.5	$40 \mu\text{g}/\text{m}^3$
	Days $>50\mu\text{g}/\text{m}^3$	0	2	35 days
Leixlip	Annual Mean PM_{10}	11.2	10.1	$40 \mu\text{g}/\text{m}^3$
	Days $>50\mu\text{g}/\text{m}^3$	1	0	35 days

As is evident from the results shown in Table 10.16, current levels of PM_{10} are well below the annual mean limit value. In the year 2022, annual mean concentrations of PM_{10} ranged from 7.9 – 20.0 $\mu\text{g}/\text{m}^3$ across all Zone C stations, with no exceedance of short-term limit values (EPA, 2023; EPA 2024). In the year 2023, annual mean concentrations of PM_{10} ranged from 8.1 – 16.4 $\mu\text{g}/\text{m}^3$ across all Zone C stations, with no exceedance of short-term limit values (EPA, 2024).

The closest representative suburban background monitoring to the site which continuously monitors for concentrations of particulate matter ($\text{PM}_{2.5}$ and PM_{10}) is located in Leixlip (ca. 5.6km east of the site). Air quality monitoring carried out at this location is likely to be broadly representative of conditions that may be experienced at the site. Concentrations of PM_{10} are well below the threshold limits contained within the regulations at Leixlip monitoring station, with an annual mean of 11.2 $\mu\text{g}/\text{m}^3$ and 10.1 $\mu\text{g}/\text{m}^3$ measured in 2022 and 2023, respectively (EPA, 2023; EPA, 2024).

A conservative estimate of the background PM_{10} levels for the region of the Proposed Development is 10.7 $\mu\text{g}/\text{m}^3$.

Measured concentrations of $\text{PM}_{2.5}$ for the years 2022 and 2023 are presented in Table 10.17 for Zone C monitoring stations.

Table 10.17: Concentrations of $\text{PM}_{2.5}$ at Zone C Monitoring Stations

Station	Averaging Period	Year	
		2022	2023
Portlaoise	Annual Mean $\text{PM}_{2.5}$ ($\mu\text{g}/\text{m}^3$) ¹⁶	8.1	7.4
Ennis		15.6	12.3
Bray		5.7	5.7
Sligo ¹⁷		-	-

¹⁶ Annual average limit value - 25 $\mu\text{g}/\text{m}^3$ (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022)

Daily limit value - 50 $\mu\text{g}/\text{m}^3$ (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022)

¹⁷ There is no data for Sligo in 2022 and 2023 due to operational issues

Station	Averaging Period	Year	
		2022	2023
Clonmel		7.3	6.1
Carlow Town		7.4	6.5
Waterford Browne's Road		9.9	7.8
Waterford Port		-	7.6
Navan		8.3	7.5
Letterkenny		10.7	9.9
Wexford Town		9.7	8.4
Limerick People's Park		9.3	6.5
Limerick Henry Street		8.4	7.2
Athlone		8.9	8.3
Tralee		12.9	10.0
Drogheda		6.9	6.0
Naas		7.5	6.6
Greystones		6.9	6.3
Leixlip		7.0	6.4
Dundalk		19.8	8.9
Galway Briarhill		9.8	7.1
Ballinasloe ¹⁸		-	10.2

As is evident from the results shown in Table 10.17, current levels of PM_{2.5} are well below the annual mean limit value of 25 µg/m³. In the year 2022, annual mean concentrations of PM_{2.5} ranged from 5.7 – 15.6 µg/m³ across all Zone C stations (EPA, 2023; EPA 2024). In the year 2023, annual mean concentrations of PM_{2.5} ranged from 5.7 – 12.3 µg/m³ across all Zone C stations (EPA, 2024).

Continuous PM_{2.5} monitoring is carried out at the Zone C suburban background location Leixlip which is considered representative of the site. Concentrations of PM_{2.5} are well below the threshold limits contained within the regulations at Leixlip monitoring station, with an annual mean of 7.0 µg/m³ and 6.4 µg/m³ measured in 2022 and 2023, respectively (EPA, 2023; EPA, 2024).

A conservative estimate of the background PM_{2.5} levels for the region of the Proposed Development is 6.7 µg/m³.

10.3.2 Sensitive Designated Ecological Habitats

Background concentrations for NO_x, NH₃, and nitrogen and acid deposition at the identified designated habitat (Rye Valley/Carton SAC) were derived from the 1 km grid square concentrations provided on the Air Pollution Information System (APIS) website (APIS, 2025), in line with UK Environment Agency (2014) and UK Defra (2016) guidance and are shown in Table 10.18.

Table 10.18: Background Concentrations for NO_x, NH₃, N Deposition and Acid Deposition

Sensitive Designated Habitat	NO _x (µg/m ³)	NH ₃ (µg/m ³)	Nitrogen Deposition (kg/ha/yr)	Acid Deposition (keqN/ha/yr)
Rye Valley/Carton SAC	6.2	2.2	6.7	0.44

The background concentrations have been added to the modelled REM outputs in Section 10.5.

¹⁸ Station newly installed in 2023, therefore low data capture for Ballinasloe in 2023

10.3.3 Macroclimate

Ireland has a typical maritime climate, largely due to its proximity to the Atlantic Ocean and the presence of the Gulf Stream. Due to the moderating effects of the Gulf Stream, Ireland does not suffer the temperature extremes that are experienced by many other countries at a similar latitude. Mean annual temperatures generally range between 9°C and 10°C. Winters tend to be cool and windy while summers are mostly mild and less windy. The prevailing wind direction is between the south and west with average annual wind speeds ranging between 6 knots in parts of south Leinster to over 15 knots in the extreme north. Rainfall in Ireland occurs throughout the year with reasonable frequency. The highest rainfall occurs in the western half of the country and on high ground and generally decreases towards the northeast. As the prevailing winds are from the west-southwest, the west of Ireland experiences the largest number of wet days. The area of least precipitation is along the eastern seaboard of the country.

10.3.4 Microclimate

The synoptic meteorological station at Baldonnel (Casement) Aerodrome is located approximately 11.3km southeast of the Proposed Development; and for the purposes of this chapter, weather data collected here may be considered similar to that which is experienced in the area of the site.

The weather in the area of the site is generally dominated by cool oceanic air masses, with cool winters, mild humid summers, and a lack of temperature extremes. Based on meteorological data at Baldonnel (Casement) Aerodrome over the last 3 years, the mean January temperature is 5 degrees Celsius (°C), while the mean July temperature is 16.3°C. The prevailing wind direction is from a quadrant centred on the southwest. These are moderately warm winds from the Atlantic and they habitually bring rain. The expected annual rainfall for the eastern half of the country ranges between 750mm and 1000mm. Easterly winds are less frequent, weaker, and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer.

Table 10.19 outlines the average climate conditions at Casement Aerodrome over a 30-year period:

Table 10.19: Latest 30-year Averages at Casement Aerodrome (1981-2010) (Source: Met Eireann)

Parameter	30 Year Average
Mean Temp (°C)	9.7
Mean Humidity at 0900UTC (%)	83.6
Mean Daily Sunshine (Hrs)	3.7
Mean Annual Rainfall (mm)	754.2
Mean Windspeeds (Knots)	10.7

10.3.4.1 Rainfall

Table 10.20 illustrates the monthly and annual rainfall data collected over a 4-year period (2021-2024) at Casement Aerodrome Station. The annual rates of precipitation ranged from 696.9 in 2021 to 870.0 in 2023 with distribution of the highest monthly rainfall values falling mainly in the autumn and winter months. This is broadly within the expected range of the eastern half of the country.

Table 10.20: Monthly Rainfall Values (mm) for Casement Aerodrome Weather Station from January 2021 to December 2023 (Source: Met Eireann)

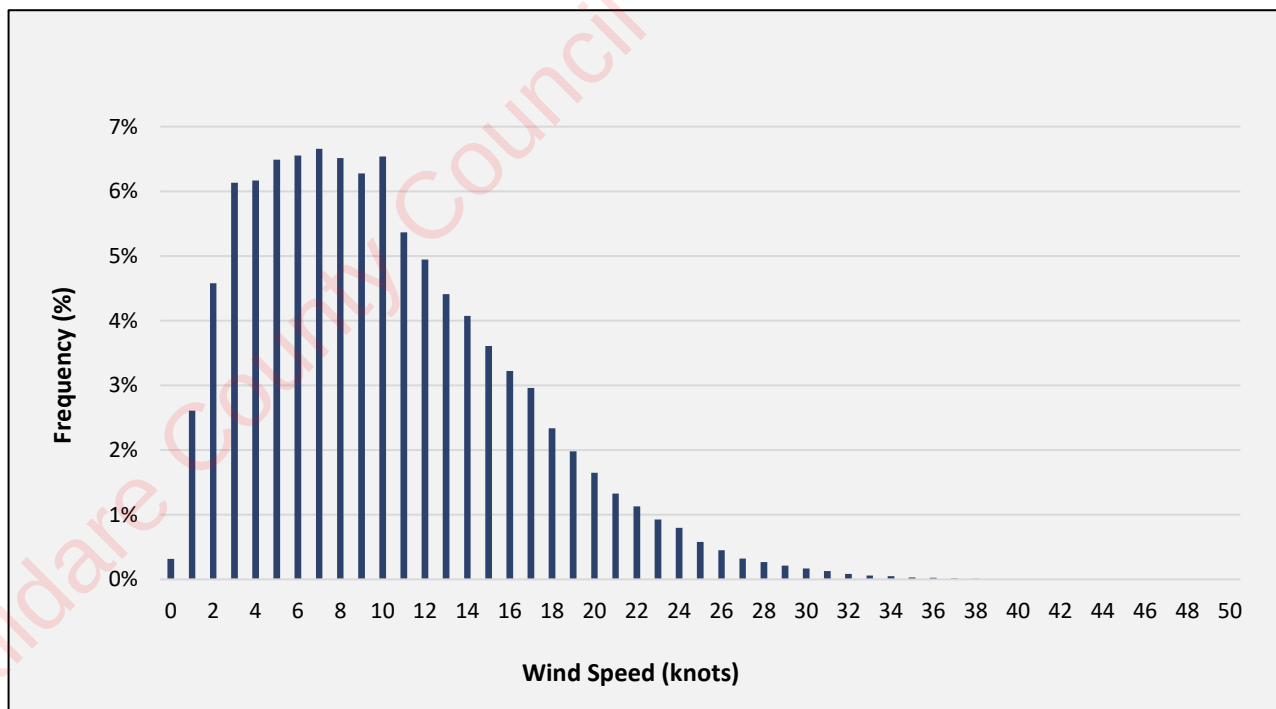
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2024	57.7	64.9	90.0	69.1	29.3	40.5	53.7	43.7	61.7	54.9	54.3	50.4	670.2
2023	52.1	15.7	109.3	67.3	24.3	45.0	124.2	84.5	112.5	116.0	41.2	27.9	870.0
2022	21.0	99.3	40.1	46.9	59.6	78.3	40.4	18.7	119.2	100.6	51.9	92.2	768.2
2021	95.8	69.7	29.6	17.9	112.7	17.8	94.0	47.3	42.1	77.2	16.4	76.4	696.9
LTA ¹⁹	63.8	48.5	50.7	51.9	59.1	62.5	54.2	72.3	60.3	81.6	73.7	75.7	754.3

10.3.4.2 Wind

Wind at a particular location can be influenced by a number of factors, such as obstructions by trees or buildings, the nature of the terrain, and deflection by nearby mountains or hills. Wind blows most frequently from the south and west for open sites while winds from the northeast and north occur less often. The analysis of hourly weather data from Casement Aerodrome synoptic weather station over a period of 30 years suggests that the predominant wind direction blows from the southwest, with windspeeds of between 11 to 16 knots occurring most frequently.

Figure 10.2 provides a wind speed frequency distribution which represents wind speed classes and the frequency at which they occur (% of time) at Casement Aerodrome weather station over a period of 30 years. Wind speeds of 7 knots have the highest frequency, occurring approximately 6.7% of the time.

Figure 10.2: Wind Speed Distribution at Casement Aerodrome Synoptic Weather Station over 30 years (1991-2020)

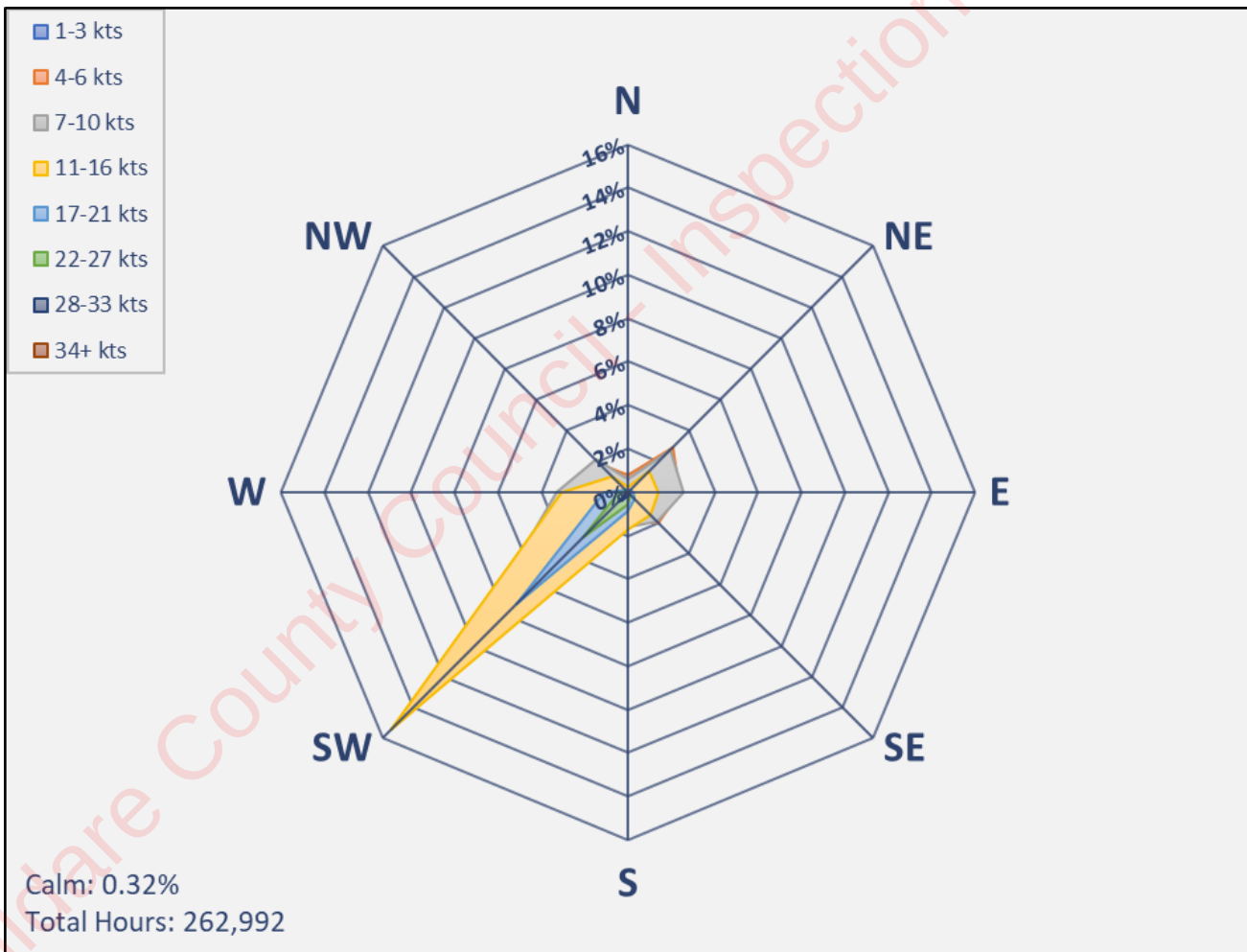


¹⁹ The 'LTA' is average for climatological long-term-average (LTA) reference period 1981-2010

Figure 10.3 provides a wind rose of the predominant wind directions and associated wind speeds at Casement Aerodrome. As is visible from Figure 10.3, the prevailing wind is from a south-westerly direction with an annual incidence of 45.86% for winds between 200 and 250 degrees. The most frequent wind speed associated with this wind direction is between 11 and 16 knots which is considered a 'moderate breeze' in terms of the Beaufort scale, this wind direction and wind speed occurs in combination approximately 15.45% of the time. The overall most common windspeed is between 7 and 10 knots, occurring in 25.98% of incidences, and wind speeds of between 11 and 16 knots occurring in 25.42% of incidences.

The lowest frequency is for winds blowing from the northern quadrant at approximately 2.4% of the time. The incidence of wind between 1 and 6 knots is about 32.53% with wind speeds of above 17 knots (8.7 m/s) occurring in just 15.53% of incidences. The influence of topography can be seen in the low frequency of winds from a southerly direction at Casement Aerodrome, which occur at 7.41% of the time; this is due to the sheltering effect of the mountains to the south. This wind rose is broadly representative of the prevailing conditions experienced at the site.

Figure 10.3: 30-year Windrose at Casement Aerodrome Weather Station 1991-2020 (Developed using Met Eireann Hourly Data)



10.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Chapter 2 sets out a description of the Proposed Development.

10.4.1 Aspects Relevant to this Assessment

10.4.1.1 Construction Phase

The aspects of the construction phase relevant to this chapter are as follows:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;
- Elevated PM₁₀, PM_{2.5} concentrations from demolition and construction activities (including earthworks and trackout); and
- An increase in concentrations of PM₁₀, PM_{2.5} and nitrogen dioxide due to exhaust emissions from vehicles and equipment used on site (non-road mobile machinery) and vehicles accessing the site.

10.4.1.2 Operational Phase

The aspects of the operational phase relevant to this chapter are as follows:

- An increase in concentrations of PM₁₀, PM_{2.5} and nitrogen dioxide due to exhaust emissions from vehicles and equipment used on site (non-road mobile machinery) and vehicles accessing the site.

10.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

10.5.1 Construction Phase

10.5.1.1 Dust Assessment

There is the potential for construction related air emissions to impact on local air quality due to the Proposed Development. The IAQM Guidance on the Assessment of Dust from Demolition and Construction (2024) provides a framework for the assessment of risk, details of which are provided in Section 10.2 of this chapter.

Potential Dust Emission Magnitude (Step 2A)

The potential magnitude of dust emissions from construction, earthworks and trackout has been assessed, as identified in Table 10.21.

Table 10.21: Dust Emission Magnitude for the site

Activity	Dust Emission Magnitude
Earthworks	Large
Construction	Large
Trackout	Medium

Sensitivity of the Area (Step 2B)

Table 10.22 outlines the sensitivity of the area to construction dust based on three factors: dust soiling, human health and ecology. The classification helps in assessing the potential effect of construction activities on air quality and guides mitigation.

Table 10.22: Sensitivity of the Area

Sensitivity Type	Factors	Sensitivity of Area	
		On-Site	Trackout
Dust Soiling	In order to account for a worst-case scenario, the sensitivity of the area has been classified as high for on-site activity (earthworks and construction) and trackout.	High	High
Human Health	EPA 2023 background concentrations for Zone C have been used in combination with correction factors to estimate current annual average PM ₁₀ concentrations in the region of the Proposed Development. These factors have been adapted from both TII (2011) projection factors. Based on these correction factors, the estimated baseline year (2024) background PM ₁₀ concentration in the region of the Proposed Development is 10 µg/m ³ . As the PM ₁₀ concentration is less than 24 µg/m ³ , the sensitivity of the area to human health impacts is considered to be low.	Low	Low
Ecology	Not applicable – no ecological receptors within study area.		

Risk of Dust Impacts (Step 2C)

The outcomes of the assessments of potential magnitude of dust emissions and the sensitivity of the area are combined to determine the risk of impact. This risk is then used to inform the selection of appropriate mitigation. Table 10.23 details the risk of dust impacts for earthworks, construction and trackout activities.

Table 10.23: Summary of Unmitigated Risks

Potential Impact	Sensitivity	Magnitude		
		Earthworks Large	Construction Large	Trackout Medium
Dust Soiling Impacts	High	High Risk	High Risk	Medium Risk
Human Health Impacts	Low	Low Risk	Low Risk	Low Risk
Ecological Impacts	Not applicable – no ecological receptors within study area.			

The dust risk categories for each of the three activities determined in STEP 2C have been used to define the appropriate, site-specific, mitigation measures to be adopted in Section 10.8 of this chapter (Step 3 as per the IAQM Guidance on the Assessment of Dust from Demolition and Construction (2024) (see Section 10.2 of this chapter)).

There is at most a high risk in terms of dust soiling and there is at most a low risk of human health impacts associated with the proposed works. Best practice dust mitigation measures appropriate for high-risk sites will be implemented to ensure there are no significant impacts at nearby sensitive receptors. In the absence of mitigation, dust impacts are predicted to be **direct, short-term, negative** and **slight**, which is overall not significant in EIA terms.

10.5.1.2 Traffic Assessment

There is also the potential for traffic emissions to affect air quality in the short-term 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 affected by the Proposed Development satisfy the TII scoping assessment criteria in Section 10.2.2.2.

It can be determined that the construction stage traffic will have a **direct, short-term, negative** and **imperceptible** impact on air quality, which is overall not significant in EIA terms.

10.5.2 Operational Phase

The potential effects of the Proposed Development have been assessed by modelling emissions from the traffic generated as a result of the development using the TII Road Emissions Model (TII, 2025). The traffic data includes the Do Nothing and Do Something scenarios. The impact of NO₂, PM₁₀ and PM_{2.5} emissions for the modelled Opening Year and Design Year was predicted at the nearest sensitive receptors to the development. This assessment allows the significance of the development, with respect to both relative and absolute impacts, to be determined.

The TII guidance PE-ENV-01106 (TII, 2022) details a methodology for determining air quality impact significance criteria for TII road schemes and infrastructure projects. However, this significance criteria can be applied to any development that causes a change in traffic. The degree of impact is determined based on both the absolute and relative effects of the Proposed Development. Results are compared against the 'Do-Nothing' scenario, which assumes that the Proposed Development is not in place in future years, to determine the degree of impact.

10.5.2.1 NO₂

The results of the assessment of the effects of the Proposed Development on NO₂ in the Opening Year 2028 and Design Year 2043 are shown in Table 10.24. The annual average concentration is in compliance with the limit value at the worst-case receptors in the year 2028 and 2043. Concentrations of NO₂ are at most 36% of the annual limit value in 2028 and 33% of the annual limit value in 2043. In addition, the TII guidance (TII, 2022) states that the hourly limit value for NO₂ of 200 µg/m³ is unlikely to be exceeded at roadside locations unless the annual mean is above 60 µg/m³. As predicted NO₂ concentrations are significantly below 60 µg/m³. It can be concluded that the short-term NO₂ limit value will be complied with at all receptor locations.

The effects of the Proposed Development on annual mean NO₂ concentrations can be assessed relative to 'Do Nothing' levels. NO₂ concentrations at the receptors assessed will increase as a result of the proposed development when compared with the Do-Nothing scenario. There will be at most an increase of 0.56 µg/m³ at receptor R2, which is a 1.4% change when compared with the ambient air quality limit value of 40 µg/m³. Where the predicted annual mean concentrations in the Opening Year and Design

Year without the proposed scheme are less than 75% of the air quality standard (see Table 10.1) and there is a less than 5% change in concentrations compared with the annual mean ambient air quality standard, then, the impact is considered neutral as per the TII significance criteria (see Table 10.2). Therefore, the effect of the Proposed Development on NO₂ concentrations according to the TII guidance (TII, 2022) is neutral.

Table 10.24: Predicted Annual Mean NO₂ Concentrations (µg/m³)

Receptor	Impact Opening Year						Description
	Do Nothing (DN)	% of AQLV	Do Something (DS)	% of AQLV	DS-DN	% of AQLV	
R1	12.76	32%	13.19	33%	0.43	1.08%	Neutral
R2	13.18	33%	13.74	34%	0.56	1.4%	Neutral
R3	13.75	34%	14.21	35%	0.46	1.2%	Neutral
R4	14	35%	14.51	36%	0.51	1.28%	Neutral
Impact Design Year							
R1	12.21	31%	12.43	31%	0.22	0.48%	Neutral
R2	12.45	31%	12.75	32%	0.3	0.75%	Neutral
R3	12.81	32%	13.06	33%	0.25	0.63%	Neutral
R4	12.96	32%	13.23	33%	0.27	0.98%	Neutral

10.5.2.2 PM₁₀

In relation to changes in PM₁₀ concentrations as a result of the proposed development, the results of the assessment can be seen in Table 10.25 for the Opening Year 2028 and Design Year 2043. The annual average concentration is in compliance with the limit value at the worst-case receptors in the year 2028 and 2043. Concentrations of PM₁₀ are at most 34% of the annual limit value in both 2028 and 2043. In addition, the Proposed Development will not result in any exceedances of the daily PM₁₀ limit value of 50 µg/m³. The effects of the Proposed Development on annual mean PM₁₀ concentrations can be assessed relative to 'Do Nothing' levels. PM₁₀ concentrations at the receptors assessed will increase as a result of the Proposed Development when compared with the Do-Nothing scenario.

There will be at most an increase of 0.53 µg/m³ at receptor R4, which is a 1.33% change when compared with the ambient air quality limit value of 40 µg/m³. As with NO₂, where the predicted annual mean concentrations in the Opening Year without the proposed scheme are less than 75% of the air quality standard (see Table 10.1) and there is a less than 5% change in concentrations compared with the annual mean ambient air quality standard, then, the impact is considered neutral as per the TII significance criteria (see Table 10.2). Therefore, the effect of the proposed development on PM₁₀ concentrations according to the TII guidance (TII, 2022) is neutral.

Table 10.25: Predicted Annual Mean PM₁₀ Concentrations (µg/m³)

Receptor	Impact Opening Year						Description
	Do Nothing (DN)	% of AQLV	Do Something (DS)	% of AQLV	DS-DN	% of AQLV	
R1	12.02	30%	12.39	31%	0.37	0.93	Neutral
R2	12.43	31%	12.92	32%	0.49	1.23	Neutral
R3	13	33%	13.45	34%	0.45	1.13	Neutral
R4	13.24	33%	13.75	34%	0.51	1.23	Neutral
Impact Design Year							
R1	12.05	30%	12.38	31%	0.33	0.83	Neutral

R2	12.47	31%	12.9	32%	0.43	1.08	Neutral
R3	13	33%	13.48	34%	0.48	1.2	Neutral
R4	13.25	33%	13.78	34%	0.53	1.33	Neutral

10.5.2.3 PM_{2.5}

In relation to changes in PM_{2.5} concentrations as a result of the proposed development, the results of the assessment can be seen in Table 10.26 for the modelled Opening Year 2028 and Design Year 2043. The annual average concentration is in compliance with the limit value at the worst-case receptors in the year 2028 and 2043. Concentrations of PM_{2.5} are most 34% of the annual limit value in both 2028 and 2043. The effect of the Proposed Development on annual mean PM_{2.5} concentrations can be assessed relative to 'Do Nothing' levels. PM_{2.5} concentrations at the receptors assessed will increase as a result of the Proposed Development when compared with the Do-Nothing scenario.

There will be at most an increase of 0.28 µg/m³ at receptor R4, which is a 1.12% change when compared with the ambient air quality limit value of 25 µg/m³. As with NO₂, where the predicted annual mean concentrations in the Opening Year without the proposed scheme are less than 75% of the air quality standard (see Table 10.1) and there is a less than 5% change in concentrations compared with the annual mean ambient air quality standard, then, the impact is considered neutral as per the TII significance criteria (see Table 10.2). Therefore, the effect of the Proposed Development on PM_{2.5} concentrations according to the TII guidance (TII, 2022) is neutral.

Table 10.26: Predicted Annual Mean PM_{2.5} Concentrations (µg/m³)

Receptor	Impact Opening Year						Description
	Do Nothing (DN)	% of AQLV	Do Something (DS)	% of AQLV	DS-DN	% of AQLV	
R1	7.43	30%	7.64	31%	0.21	0.84	Neutral
R2	7.66	31%	7.93	32%	0.27	1.08	Neutral
R3	7.97	32%	8.22	33%	0.25	1	Neutral
R4	8.11	32%	8.39	34%	0.28	1.12	Neutral
Impact Design Year							
R1	7.44	30%	7.63	31%	0.19	0.76	Neutral
R2	7.67	31%	7.91	32%	0.24	0.96	Neutral
R3	7.96	32%	8.23	33%	0.27	1.08	Neutral
R4	8.1	32%	8.4	34%	0.3	1.2	Neutral

Overall, the TII significance criteria have identified neutral impacts due to increases in NO₂, PM₁₀ and PM_{2.5} annual mean concentrations which are less than 5% of the annual mean ambient air quality standards (and the annual mean concentrations are less than 75% of the air quality standard). This equates to a potential effect of the proposed development on ambient air quality, and human health, in the operational stage according to the EPA guidelines (EPA, 2022) which is considered **direct, long-term, negative** and **not significant**.

10.5.2.4 Ecological Impacts

An assessment of the impact of the Proposed Development has been undertaken using the approach outlined in the IAQM guidance document (IAQM, 2020) and the TII guidance (TII, 2022). An assessment of the ecologically sensitive sites has been carried out. As outlined in Section 10.2.3.1.3, sections of the

Rye Water Valley/Carton SAC (Site Code 001398) are within 200m of a road link (R148) impacted by the Proposed Development.

Annual mean NO_x and ammonia concentrations, as well as nitrogen and acid deposition levels have been compared to the relevant critical levels and loads in Table 10.27 for the Opening Year 2028 and in Table 10.28 for Design Year 2043 for the worst-case ecologically sensitive receptors. The ground level concentrations, nitrogen deposition flux and acid deposition flux are presented for the closest locations within the ecological sites nearest to the affected road.

The results in Table 10.27 and Table 10.28 include background concentrations as per Table 10.18. With respect to both Total Nitrogen Deposition Flux and Total Acid Deposition Flux there are both a lower and an upper critical load threshold (see Table 10.14). With respect to NO_x and NH₃, results have been compared against the appropriate limit value of 30 µg/m³ and 3 µg/m³, respectively.

Table 10.27: Opening Year 2031 Maximum Predicted NO_x and NH₃ Concentrations, and Nitrogen and Acid Deposition Rates at Closest Point within Ecological Sites to Road

	Predicted Ground Level NO _x Concentration (including background) µg/m ³	Predicted Ground Level NH ₃ Concentration (including background) µg/m ³	Total Nitrogen Deposition Flux (kg/ha/yr)	Total Acid Deposition Flux (keq/ha/yr)
Do-Nothing	6.25	2.25	7.02	0.46
Do-Something	6.26	2.25	7.02	0.46
Difference between Do-Something and Do-Minimum	0.01	No change	No change	No change
Change relative to lower critical load (%)	0.03%	No change	No change	No change
Change relative to upper critical load (%)			No change	No change

Table 10.28: Design Year 2043 Maximum Predicted NO_x and NH₃ Concentrations, and Nitrogen and Acid Deposition Rates at Closest Point within Ecological Sites to Road

	Predicted Ground Level NO _x Concentration (including background) µg/m ³	Predicted Ground Level NH ₃ Concentration (including background) µg/m ³	Total Nitrogen Deposition Flux (kg/ha/yr)	Total Acid Deposition Flux (keq/ha/yr)
Do-Nothing	6.23	2.24	7.02	0.46
Do-Something	6.24	2.24	7.02	0.46
Difference between Do-Something and Do-Minimum	0.01	No change	No change	No change
Change relative to lower critical load (%)	0.03%	No change	No change	No change
Change relative to upper critical load (%)			No change	No change

10.5.2.5 Conclusion

The annual mean NO_x concentrations (including background) are below the critical level of 30 µg/m³ at all modelled habitats, in both the DN and the DS scenarios, in both the Opening and Design Years. The annual mean NH₃ concentrations (including background) are below the critical level of 3 µg/m³ at all modelled habitats, in both the DN and the DS scenarios, in both the Opening and Design Years.

Nitrogen deposition levels (including background) are within the range of critical loads for nitrogen deposition (see Table 10.14) at all modelled habitats, in both the DN and the DS scenarios, in both the Opening and Design Years. The acid deposition (as N) levels are within the range of critical loads for acid deposition (as N) (see Table 10.14) at all modelled designated sites, in both the DN and the DS scenarios, in both the Opening and Design Years.

In accordance with the EPA Guidelines (EPA, 2022) the ecological impacts associated with the operational phase traffic emissions are overall **direct, long-term, negative** and **slight**.

10.5.2.6 CO₂

There is the potential for increased traffic volumes to effect climate, therefore, traffic related CO₂ emissions have also been calculated through the use of the TII REM tool. The output is provided in terms of CO₂eq for the Opening Year (2028) and Design Year (2043). 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.

The predicted concentrations of CO₂ for the Opening Year (2028) and Design Year (2043) are detailed in Table 10.29, the effect of the increased traffic volumes on Climate is discussed in Chapter 11 'Climate'.

Table 10.29: Climate Traffic Assessment

Year	Scenario	CO ₂ eq (tonnes/annum)
2028	Do Nothing	3,169.55
	Do Something	3,897.07
2043	Do Nothing	3,210.72
	Do Something	3,993.96
Increment in 2028		727.52
Increment in 2043		783.24

10.6 POTENTIAL CUMULATIVE IMPACTS

Cumulative Impacts can be defined as “impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project”. Effects which are caused by the interaction of effects, or by associated or off-site projects, are classed as indirect effects. Cumulative effects are often indirect, arising from the accumulation of different effects that are individually minor.

Cumulative air quality impacts have the potential to arise locally when construction activities associated with the proposed development take place at the same time as other developments in a specific location.

A review of other off-site developments was completed as part of this assessment. Appendix 2.1 of Chapter 2 details the existing, proposed and granted planning permissions on record in the area, a review of these planning permissions has been completed as part of this assessment.

The potential impacts on air quality are assessed in Section 10.5 and it is considered that there are no other potential significant cumulative impacts associated with the Proposed Development and considered offsite permitted developments.

In terms of dust, no significant impacts are predicted; good construction practice, which incorporates the implementation of the identified mitigation measures, will be employed at the proposed development site. Due to the implementation of good construction practices at the site of the proposed development and these offsite permitted developments, it is not anticipated that significant cumulative impacts will occur.

Assessment of operational stage impacts on air quality involved traffic data which is inclusive of traffic associated with other existing and permitted developments on the road networks surrounding the site both in current and future years. Therefore, cumulative impacts have been assessed in this regard and the impact on ambient air quality has been determined as insignificant.

It is considered that there are no other potential significant cumulative impacts associated with the proposed development and considered offsite permitted developments.

10.7 'DO NOTHING' IMPACT

If the Proposed Development were not to proceed, ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic etc). Under the Do-Nothing Scenario, construction works associated with the Proposed Development will not take place. Impacts from increased traffic volumes and associated emissions from the Proposed Development will also not occur.

10.8 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

10.8.1 Construction Phase

AIR CONST 1: Communications

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager;
- Display the head or regional office contact information; and
- Develop and implement a Dust Management Plan (DMP), the final dust management plan will form part of the overall construction management plan which will formally be prepared and submitted to Kildare Council post grant of planning permission.

AIR CONST 2: Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- Make the complaints log available to the local authority when asked;
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book; and
- Hold regular liaison meetings with other high risk construction sites within 250m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.

AIR CONST 3: Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the Kildare County Council

when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary;

- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the Kildare County Council when asked; and
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

AIR CONST 4: Preparing and Maintaining the site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Avoid site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below; and
- Cover, seed or fence stockpiles to prevent wind whipping.

AIR CONST 5: Operating Vehicle/Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles;
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable; and
- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved haul roads.

AIR CONST 6: Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable.

AIR CONST 7: Waste Management

- Avoid bonfires and burning of waste materials.

AIR CONST 8: Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable; and
- Only remove the cover in small areas during work and not all at once.

AIR CONST 9: Measures Specific to Construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

AIR CONST 10: Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site log book;
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowzers and regularly cleaned;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; and
- Access gates to be located at least 10 m from receptors, where possible.

10.8.2 Operational Phase

It has been determined that the operational phase air quality impact is negligible and therefore no site-specific mitigation measures are proposed.

10.9 RESIDUAL EFFECTS OF THE PROPOSED DEVELOPMENT

The IAQM recommends that significance is only assigned to effect after considering the construction activity mitigation. The risk of dust impacts has been determined in Step 2C and the appropriate dust mitigation measures identified in Step 3 (Section 10.8 of this chapter) and the final step is to determine whether there are significant effects arising from the construction phase of the Proposed Development. The proposed mitigation measures will ensure that a potential significant adverse effect will not occur, therefore, the residual effect will not be significant.

The traffic generated by the Proposed Development has been assessed for its impact on air quality and it has been determined to have an overall not significant impact in terms of local air quality with the implementation of the proposed mitigation measures.

10.10 MONITORING

The monitoring of construction dust during the construction phase of the Proposed Development is recommended to ensure that impacts are not experienced beyond the site boundary. Monitoring of dust can be carried out by using the Bergerhoff Method. This involves placing Bergerhoff Dust Deposit Gauges at a strategic locations along the site boundaries for a period of 30 +/- 2 days. The selection of sampling point locations should be carried out in consideration of the requirements of VDI 2119 with respect to the

location of the samplers relative to buildings and other obstructions, height above ground, and sample collection and analysis procedures. After the exposure period is complete, the Gauges should be removed from the site; the dust deposits in each Gauge will then be determined gravimetrically and expressed as a dust deposition rate in $\text{mg}/\text{m}^2/\text{day}$ in accordance with the relevant standard.

Due to the negligible impact on air quality from the operational phase of the Proposed Development, no specific monitoring is recommended.

10.11 REINSTATEMENT

Not Applicable for Air Quality.

10.12 INTERACTIONS

10.12.1 Population and Human Health

Interactions between air quality and population and human health have been considered as the proposed development has the potential to cause health issues as a result of impacts on air quality from dust nuisances and potential traffic derived pollutants. However, the mitigation measures employed at the Proposed Development will ensure that all impacts are compliant with ambient air quality standards and human health will not be affected. Furthermore, traffic-related pollutants have been assessed and determined as having an overall insignificant impact, therefore air quality impacts from the proposed development are not expected to have a significant impact on population and human health.

10.12.2 Biodiversity

Interactions between air quality and biodiversity have been considered as the construction phase has the potential to interact with flora and fauna in adjacent habitats and designated sites due to dust emissions arising from the construction works. However, the mitigation measures employed at the Proposed Development will ensure that the impacts to flora and fauna are not significant.

10.12.3 Land and Soils

Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between air quality and land and soils in the form of dust emissions. With the appropriate mitigation measures to prevent fugitive dust emissions, it is predicted that there will be no significant interactions between air quality and land and soils during the construction phase. There are no potentially significant interactions identified between air quality, and land, soils and hydrogeology during the operational phase.

10.12.4 Climate

Air quality and climate have interactions as the emissions from the burning of fossil fuels during the construction phase generate both air quality and climate impacts. There is no impact on climate due to air quality. However, the sources of impacts on air quality and climate are strongly linked.

10.12.5 Traffic

There can be a significant interaction between air quality and traffic. This is due to traffic-related pollutants that may arise. In the current assessment, traffic derived pollutants which may affect air quality have been deemed not significant. Therefore, the impact of the interaction between air quality and traffic is not significant.

10.13 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties have been encountered while compiling this chapter.

10.14 REFERENCES

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APPENDIX 10.1

FULL COPY OF ANNUAL AVERAGE DAILY TRAFFIC (AADT)

Link Number	Road Name	Opening Year (2028)		Design Year (2043)	
		Do Nothing	Do Something	Do Nothing	Do Something
		AADT	AADT	AADT	AADT
1	Griffin Rath Manor	1,409 (2% HGV)	1,648 (2% HGV)	1,461 (2% HGV)	1,702 (2% HGV)
2	R405	6,934 (3% HGV)	9,128 (2% HGV)	7,149 (3% HGV)	9,128 (2% HGV)
3	Dunboyne Road	8,797 (4% HGV)	9,284 (3% HGV)	9,140 (4% HGV)	9,627 (3% HGV)
4	R148	9,885 (3% HGV)	11,839 (3% HGV)	10,270 (3% HGV)	12,104 (3% HGV)

RECEIVED: 02/10/2025

Kildare County Council - Inspection Purposes Only

CHAPTER 11

CLIMATE

11.0 CLIMATE

11.1 INTRODUCTION

This chapter of the EIAR identifies, describes, and presents an assessment of the eventual significant direct and indirect effects of the Proposed Development at Lands at Railpark, Maynooth, Co. Kildare on climate (for example greenhouse gas emissions) and its vulnerability to climate change.

It should be read in conjunction with Ch10. Air Quality, Ch14. Material Assets, Ch13, Traffic and Transport, Flood Risk Assessment and the Traffic and Transport Assessment, as well as the Energy Analysis Report, Building Life Cycle Assessment Report and Site-Specific Flood Risk Assessment submitted with the planning application. The daylight and sunlight assessment and microclimate / wind assessment of the proposed development is a separate matter to the EIAR and is addressed in standalone reports prepared by GIA accompanying the application.

The Proposed residential Development will provide a total of 581 no. residential units, consisting of 185 no. apartment / duplex units and 396 no. houses.

The proposed neighbourhood centre is arranged in a 5 storey block and a part 6 storey block with a new public plaza and includes a range of community and commercial uses, comprising a childcare facility (762 sq.m), café unit (74 sq.m), health centre (174 sq.m), pharmacy/shop (124 sq.m) and a convenience shop (166 sq.m). A total of 89 no. apartments units are proposed at upper levels of the neighbourhood centre. A total of 888 no. car parking spaces are proposed, which includes 711 no. in-curtilage spaces for houses, 115 no. spaces for the duplex apartments / apartments, 14 no. for the commercial uses at the neighbourhood centre, 12 no. spaces for the staff of the childcare facility and 36 no. visitor spaces for residents. A total of 623 no. cycle spaces are proposed for residents, 42 no. spaces for the neighbourhood centre uses and 93 no. visitor cycle parking spaces.

The proposal includes hard and soft landscaping, lighting, boundary treatments, communal open space, public open space including a Local Park and Pocket Parks, children's play areas and an ancillary play area for the childcare facility.

The Proposed Development provides for access from the permitted Maynooth Eastern Ring Road (MERR), including a new pedestrian/cyclist signalised crossing, associated internal roads, pedestrian and cycle paths and access points provided up to the application site boundary to provide for potential future connections to adjoining lands to the north and south, subject to agreement with the Planning Authority / adjacent landowner.

The development includes foul and surface water drainage, 6 no. ESB Substations, services and all associated and ancillary site works and development. A full description of the development can be found in Chapter 2.

Climate change is recognised as one of the most serious global environmental problems and arguably the greatest challenge facing humanity today. While natural variations in climate over time are normal, anthropogenic activities have interfered greatly with the global atmospheric system by emitting substantial amounts of greenhouse gases (GHGs). This has caused a discernible effect on our global climate system,

with continued change expected due to current and predicted trends of GHG emissions. In Ireland this is demonstrated by rising sea levels, changes in the ecosystem, and extreme weather events.

The assessment examines the potential impacts during the construction and operational phases of the Proposed Project. This chapter should be read in conjunction with the following chapters, which present related impacts arising from the proposed Project:

- Chapter 2 Project Description;
- Chapter 7 Land and Soils;
- Chapter 9 Water (Including Hydrology and Flood Risk);
- Chapter 10 Air Quality;
- Chapter 13 Traffic and Transportation and
- Chapter 14 Material Assets

Attention will be focused on Ireland's obligations under the Paris Agreement in the context of the overall climatic impact of the presence and absence of the Proposed Development.

11.1.1 Quality Assurance and Competency of Experts

This chapter was prepared by Aoife Gillen, Principal Sustainability Consultant, DNV consulting. Aoife has a Master of Science (hons) degree. Aoife has worked as a Sustainability Consultant with DNV since 2024 and has built up experience preparing climate change impact assessments, environmental impact assessment (EIA) screening reports, air quality and climate, scheme sustainability statements and climate action and sustainability statements for clients.

11.1.2 Greenhouse Gas Emissions in Ireland

Ireland's latest greenhouse gas (GHG) emissions 1990-2023 are based on the Sustainable Energy Authority Ireland's (SEAI's) provisional energy balance released in May 2025 (EPA, 2025). In 2023, Ireland's GHG emissions are estimated to be 58.82 million tonnes carbon dioxide equivalent (Mt CO₂eq), which is 6.1% lower (or 3.79 Mt CO₂eq) than emissions in 2022 (62.26 Mt CO₂eq) and follows a 3.0% decrease in emissions reported for 2022. Emissions are 3.3% below the historical 1990 baseline for the first time in 33 years.

Arresting growth in emissions is a challenge in the context of a growing economy but one which must continue to be addressed by households, business, farmers and communities if Ireland is to reap the benefits of a low-carbon economy.

The final greenhouse gas emission inventory for 2023 is the third 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 is to reduce its greenhouse gas emissions by at least 42% by 2030 compared with 2005 levels, with a number of flexibilities available to assist in achieving this. The ESR includes the sectors outside the scope of the EU Emissions Trading System (ETS) (such as Agriculture, Transport, Residential, Public Services and Commercial Services and Waste).

Ireland's ESR emissions annual limit for 2023 is 40.52 Mt CO₂eq. Ireland's final 2023 greenhouse gas ESR emissions are 42.74 Mt CO₂eq, this is 2.22 Mt CO₂eq more than the annual limit for 2023. This value is the national total emissions less emissions generated by stationary combustion i.e. power plants, cement plants, and domestic aviation operations that are within the EU's emissions trading scheme. Cumulatively from 2021-2023 and after using the ETS flexibility, Ireland is in compliance with the ESR by a net distance to target of 0.22 Mt CO₂eq, although in 2023 there is an exceedance of 0.29 Mt CO₂eq above its Annual Emissions Allocation with the ETS flexibility. Agriculture and Transport accounted for 75.9% of total ESR emissions in 2023. The revised LULUCF Regulation (2023) incorporates new rules around LULUCF flexibilities for the period 2021-2025 and 2026-2030. There is a high degree of uncertainty relating to the availability of the LULUCF flexibility and, if available, the quantity of flexibility in each budgetary period.

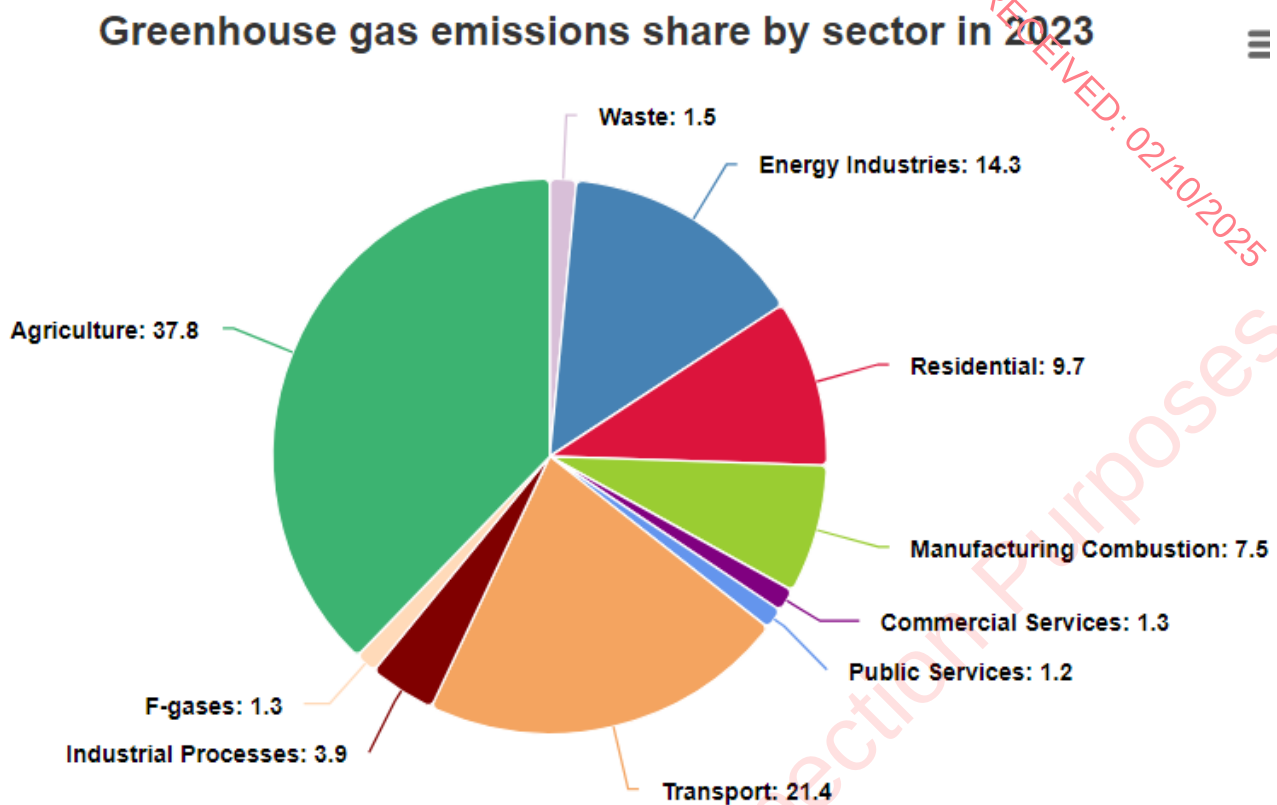
The latest projections (May 2025) indicate that currently implemented measures (With Existing Measures) will achieve a reduction of 10% on 2005 levels by 2030, significantly short of the 42% reduction target. If measures in the higher ambition (With Additional Measures) scenario are implemented, EPA projections show that Ireland can achieve a reduction of 22% by 2030, still short of the 42% reduction target.

In terms of the 2030 targets, the ESR provides two flexibilities (use of ETS allowances and credit from action undertaken in the land use, land use change and forestry (LULUCF) sector) to allow for a fair and cost-efficient achievement of the targets. New Regulations in 2023 mean there are new rules around LULUCF flexibility that incorporates split budgets 2021-2025 to 2026-2030[1]. Additional analyses are needed to estimate the impact of the new rules on flexibilities. In the interim, based on latest LULUCF inventory and projections data, the maximum amount of LULUCF flexibility now projected to be available is 13.4 Mt CO₂eq in the first 5-year period (or 2.68 Mt CO₂eq per annum), with no flexibility available in the second 5-year period.

Ireland's greenhouse gas (GHG) emissions increased in the period from 1990 to 2001 where it peaked at 70.85 Mt CO₂ equivalent, before displaying a downward trend to 2014. Emissions increased by 4.0% and 3.8%, respectively in the years, 2015 and 2016 and remained relatively stable in 2017 and 2018, followed by a 3.0% decrease in 2019. In 2020 total national GHG emissions were 3.6% lower than 2019 emissions largely driven by the covid restrictions. The gradual lifting of covid restrictions in 2021 along with an increase in the use of coal and less renewables within electricity generation resulted in a 4.5% increase in emissions in 2021 compared to 2020. A 2.1% decrease in emissions was seen in 2022 compared to 2021, mainly due to a substantial decrease in residential sector emissions combined with decreases from industry, agriculture and electricity generation. This was followed by a 6.8% reduction in emissions in 2023. Ireland's GHG emissions have decreased by 3.3% from 1990-2023.

In relation to the greenhouse gases; carbon dioxide (CO₂) accounted for 61.1% of the total, with methane (CH₄) and nitrous oxide (N₂O) contributing 28.9% and 8.8% as CO₂ equivalent, respectively and F-gases contributing 1.2% of the total as CO₂ equivalent.

In 2023, the energy industries, transport and agriculture sectors accounted for 73.5% of total GHG emissions. Agriculture is the single largest contributor to the overall emissions, at 37.7%. Transport, energy industries and the residential sector are the next largest contributors, at 21.5%, 14.3% and 9.7%, respectively.

Figure 11.1: Ireland's Greenhouse Gas Emissions Share by Sector 2023 (Source: EPA, 2024)

The Climate Change Advisory Council submitted their Annual Review 2023 to the Minister of the Environment, Climate and Communications on 24th of June 2024. Detailed key messages, including observations and recommendations for each sector (electricity; transport; built environment; enterprise and waste; agriculture, forestry and other land use; and biodiversity), can be found at the beginning of each chapter in the annual review (CCAC, 2024). The overall recommendations are as follows:

- The Council strongly recommends that the Government urgently conducts a full review of taxation in the Transport sector (including vehicle registration tax, motor tax, excise duty, carbon tax, fuel pricing and distance-based charges) to ensure that taxation policy for households and businesses supports emission targets, is aligned with climate objectives, promotes energy efficiency and minimises negative impacts on society.
- Government and local authorities should reallocate road space to provide better access for more sustainable modes of transport, such as walking, cycling or taking a bus. Public transport services need to improve, and more public engagement is needed to understand the barriers people face in making sustainable transport choices.
- The Government must urgently complete the planning reform necessary to:
 - ensure that new developments reduce transport demand by placing homes, workplaces, public services and leisure spaces closer to each other and nearer to public and active transport (e.g. walking and cycling) infrastructure,
 - speed up the delivery of major public and active transport infrastructure projects and minimise the costs and delays associated with the planning process.

- Local authorities must have the support and guidance from Government that they need to reduce transport demand and emissions, with locally implemented measures such as low-emission zones and provision of shuttle bus services or incentives to promote carpooling.
- The number of car journeys to and from schools needs to be reduced by significantly expanding the School Transport Scheme and continuing work to increase the number of pupils walking and cycling to school.
- The Government needs to prioritise measures and investments to strengthen the resilience of ports and critical roads and railways to the future impacts of climate change such as more intense rainfall events and sea level rise.

11.1.3 Legislation, Policy and Guidance

The key legislation and guidance referenced in the preparation of the EIAR is outlined in Chapter 1: Introduction. Specific to Climate, the following legislation, guidance, and planning framework relevant to the consideration of this factor has informed the assessment as outlined below.

11.1.3.1 International Legislation/Commitments/Agreements

In March 1994, the United Nations Framework Convention on Climate Change (UNFCCC) was established as an intergovernmental effort to tackle the challenges posed by climate change. The Convention membership is almost universal, with 197 countries having ratified. Under the Convention, governments gather and share information on GHG emissions, national policies, and best practices. This information is then utilised to launch national strategies and international agreements to address GHG emissions. Following the formation of the UNFCCC, two major international climate change agreements were adopted: The Kyoto Protocol, and the Paris Agreement.

In April 1994, Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) and subsequently signed the Kyoto Protocol in 1997. The Kyoto Protocol is an international agreement linked to the UNFCCC which commits its parties to legally binding emission reduction targets. In order to ensure compliance with the protocol, the Intergovernmental Panel on Climate Change (IPCC) has outlined detailed guidelines on compiling National Greenhouse Gas Inventories. These are designed to estimate and report on national inventories of anthropogenic GHG emissions and removals. Under Article 4 of the Kyoto Protocol, Ireland agreed to limit the net anthropogenic growth of the six named GHGs to 13% above the 1990 level, spanning the period 2008 to 2012 (IPPC, 2006).

The second commitment period of the Kyoto Protocol was established by the Doha amendment which was adopted in extremis on the 8th of December 2012, to impose quantified emission limitation and reduction commitments (QELRCs) to Annex I (developed country) Parties during a commitment period from 2013 to 2020. 38 developed countries, inclusive of the EU and its 28 member states, are participating. Under the Doha amendment, participating countries have committed to an 18% reduction in emissions from 1990 levels. The EU has committed to reducing emissions in this period to 20% below 1990 levels. Ireland's QELRCs for the period 2013 to 2020 is 80% of its base year emissions. Ireland's compliance with the Doha amendment will be assessed based on the GHG inventory submission in 2022 for 1990-2020 data. As of October 2020, the Doha Amendment has received the required number of ratifications to enter into force. Once in force, the emission reduction commitments of participating developed countries and economies in transition (EITs) become legally binding.

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030. The 17 SDGs are integrated—that is, they recognise that action in one area will affect outcomes in others, and that development must balance social, economic, and environmental sustainability. The creativity, knowhow, technology and financial resources from all of society is necessary to achieve the SDGs in every context. At its heart, the SDGs are about global partnership for this call to action. No matter how large or small, and regardless of their industry, all companies can contribute to the SDGs through their sustainability and corporate social responsibility strategies, policies, and processes.

Figure 11.2: UN Sustainable Development Goals



(Source: [THE 17 GOALS | Sustainable Development](#))

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

11.1.3.2 European Legislation

GHG Legislation

In December 2015, the Paris Climate Change Conference (COP21) took place and was an important milestone in terms of international climate change agreements. The Paris Agreement sets out a global action plan to put the world on track to mitigate dangerous climate change by setting a global warming limit not to exceed 2°C above pre-industrial levels, with efforts to limit this to 1.5°C. As a contribution to the objectives of the agreement, countries have submitted national climate action plans (nationally

determined contributions, (NDCs)). Under this agreement, governments agreed to come together every 5 years to assess the collective progress towards the long-term goals and inform Parties in updating and enhancing their nationally determined contributions. Ireland will contribute to the Paris Agreement through the NDC tabled by the EU on behalf of Member States in 2020, which commits to a 55% reduction in EU-wide emissions by 2030 compared to 1990. This is considered to be the current NDC maintained by the EU and its Member States under Article 4 of the Paris Agreement.

The EU has set itself targets for reducing its GHG emissions progressively up to 2050, these are outlined in the 2020 climate and energy package and the 2030 climate and energy policy framework. These targets are defined to assist the EU in transitioning to a low-carbon economy, as detailed in the 2050 low carbon roadmap. The 2020 package is a set of binding legislation to ensure that the EU meets its climate and energy targets for the year 2020 (EEA; 2020). There are three key targets outlined in the package which were set by the EU in 2007 and enacted in legislation in 2009:

- 20% reduction in GHG emissions from 1990 levels;
- 20% of EU energy to be from renewable sources; and
- 20% improvement in energy efficiency.

The 2030 climate and energy framework builds on the 2020 climate energy package and was adopted by EU leaders in October 2014. The framework sets three key targets for the year 2030:

- At least 40% cuts in GHG emissions from 1990 levels;
- At least 32% share for renewable energy; and
- At least 32.5% improvement in energy efficiency.

The EU has acted in several areas in order to meet these targets, including the introduction of the Emissions Trading System (ETS). The ETS is the key tool used by the EU in cutting GHG emissions from large-scale facilities in the power, industrial, and aviation sectors. Around 45% of the EU's GHG emissions are covered by the ETS.

As part of the European Green Deal, the EU Commission proposed in September 2020 to raise the 2030 greenhouse gas emission reduction target, including emissions and removals, to at least 55% compared to 1990. The European Climate Law came into force in July 2021 and writes into law the goal set out in the European Green Deal for Europe's economy and society to become climate-neutral by 2050. The law also sets the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

11.1.3.3 National Legislation

Climate Action and Low Carbon Development Act

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

The 2021 Act provides a legally binding framework with clear targets and commitments set in law, and ensures the necessary structures and processes are embedded on a statutory basis to ensure Ireland achieves its national, EU and international climate goals and obligations in the near and long term. Policy amendments will involve the rapid electrification of transport system: electric bikes, electric vehicles, and electric public transport. This will be enacted in tandem with a ban on new registrations of petrol and diesel cars from 2030. Furthermore, there will be a policy to incentivise behavioural changes by increased effective modal shift to walking, cycling and public transport infrastructure.

The 2021 Climate Act incorporates carbon budgets and sectoral emissions limits, defining the carbon budget as the total allowable greenhouse gas emissions during the budget period. Consequently, the Act has removed any mention of a national mitigation plan, replacing it with references to both former and latest versions of the Climate Action Plan, as well as a series of National Long Term Climate Action Strategies. Additionally, it has updated the national transition objective to a national climate objective, committing “to pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy” (Government of Ireland; 2022).

Section 6B (12) of the 2021 Climate Act requires the Minister for the Environment, Climate and Communications to publish the approved carbon budget programme. In May 2022, the budgets were published and the total emissions allowed under each budget is set out below, as well as the average annual reduction for each 5-year period (DECC, 2022):

- 2021-2025: 295 Mt CO₂eq - this represents an average reduction in emissions of 4.8% per annum for the first budget period.
- 2026-2030: 200 Mt CO₂eq - this represents an average reduction in emissions of 8.3% per annum for the second budget period.
- 2031-2035: 151 Mt CO₂eq - this represents an average reduction in emissions of 3.5% per annum for the third provisional² budget.

To meet these targets, the government published a set of Sectoral Emissions Ceilings in July 2022. Industry and Buildings (Residential) have a 35% and 40% reduction requirement respectively and a 2030 emission ceiling of 4 Mt CO₂e.

The assessment in this chapter has been prepared in accordance with, among other things, the 2021 Act and the EIA Directive.

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

The proposed project is consistent with the following plans, strategies and objectives specified in section 15 of the Climate Action and Low Carbon Development Act 2015, as amended:

- The National Climate Objective;
- The most recent Climate Action Plan;
- The most recent National Long-Term Climate Action Strategy;
- The most recent National Adaptation Framework; and

- The objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State.

The Act mandates the relevant Minister to develop the Climate Action Plan, the National Long-Term Climate Action Strategy, and the National Adaptation Framework to achieve the National Climate Objective (DECC, 2021). This objective of becoming 'climate neutral' by 2050 aligns with the EU's climate goal as established in Regulation (EU) No 2021/1119 (the 'European Climate Law'). The European Climate Law enshrines into EU legislation the target set by the European Green Deal for the EU to attain climate neutrality, or 'net zero' greenhouse gas emissions, by 2050.

The Climate Action Plan 2025 (CAP25) is the fourth annual update to Ireland's Climate Action 2019 (the plans are to be updated annually to ensure alignment with Ireland's legally binding economy-wide carbon budgets and sectoral ceilings) (DECC; 2023). This plan is the third to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021, and following the introduction, in 2022, of economy-wide carbon budgets and sectoral emissions ceilings. The plan had a delayed launch on April 15th, 2025.

The plan implements the carbon budgets and sectoral emissions ceilings and sets out a roadmap for taking decisive action to halve our emissions by 2030 and reach net zero no later than 2050, as committed to in the Programme for Government. Climate Action Plan 2025 builds on Climate Action Plan 2024, outlining how Ireland will accelerate the actions required to respond to the climate crisis, putting climate solutions at the centre of Ireland's social and economic development (DECC; 2025). Climate Action Plan 2025 is a streamlined Climate Action Plan, to be read in conjunction with Climate Action Plan 2024. It is also the final Climate Action Plan of the first 5-year Carbon Budget – marking an important midpoint in what has been called the decade of climate action.

The supplementary Annex of Actions, approved by the Irish Government, provides the specific actions required to implement the targets set out in the Plan, and includes information regarding outputs, lead departments, timelines and stakeholders. For 2025 a similar approach to the 2024 Annex has been implemented that will see only new, high-impact actions included in the Annex, while the full roadmap of actions to support the delivery of our climate targets remains within the Climate Action Plan itself (DECC; 2025).

11.1.3.4 National Policy

National Adaptation Framework (NAF)

Ireland's statutory National Adaptation Framework (NAF) was published in June 2024 and was developed under the Climate Action and Low Carbon Development Act 2015. The NAF sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts.

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

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

Just Transition

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

The just transition framework is made up of four principles (DECC; 2021):

- An integrated, structured, and evidence-based approach to identify and plan our response to just transition requirements.
- People are equipped with the right skills to be able to participate in and benefit from the future net zero economy.
- The costs are shared so that the impact is equitable, and existing inequalities are not exacerbated.
- Social dialogue to ensure impacted citizens and communities are empowered and are core to the transition process.

Regional Policy

Action 8 of the National Adaptation Framework (DCCAE 2018) indicates that four regional climate offices must be established, and the Eastern & Midlands Climate Action Regional Office (CARO) is one of these offices. One of the responsibilities of the CARO is to assist local authorities within their region in preparing a Climate Change Action Plan.

11.1.3.5 Kildare Council Climate Action Plan 2024-2029

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

- Governance and Leadership
- Built Environment and Transport
- Natural Environment & Green Infrastructure
- Communities: Resilience and Transition
- Sustainability & Resource Management

The actions in these themes collectively address the main goals and targets of this plan:

1. 50% improvement in Kildare CC's energy efficiency by 2030
2. 51% reduction in Kildare CC's greenhouse gas emissions by 2030
3. To make Kildare a climate resilient region for all, by reducing the impacts of future climate change-related events;
4. Empower the local community to engage with climate action through education, support, and ongoing collaboration and;
5. Enable socio-economic growth, placemaking and community development aligned to decarbonisation and a just transition.

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

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

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

11.1.3.6 Kildare County Development Plan (CDP) 2023-2029

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

The Energy & Communications chapter of the plan (Chapter 7) sets out detailed policy objectives in relation to climate action and the role of planning in climate change mitigation, climate change adaptation, and the transition towards a more climate resilient County. The Chapter addresses four key issues, namely:

- Energy Efficiency;
- Renewable Energy;
- Energy Supply & Infrastructure;
- Climate Adaptation & Mitigation

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

The creation of a climate resilient County is an overarching strategic outcome of the Kildare CDP, and as such, the theme permeates the entire plan with a selection of policy objectives in multiple Chapters all

contributing to aid in the transition of the County to a climate resilient low carbon society⁵. Relevant policy objectives and their incorporation into the Proposed Development design have been considered in the preparation of this Chapter.

The Kildare Climate Change Action Plan' (2024-2029) outlines a number of goals and plans to prepare for and adapt to climate change. There are five key action areas within the plan: energy and buildings, transport, flood resilience, nature-based solutions and resource management.

The Kildare CC Climate Change Action Plan noted that residential sector accounted for 391,323 tCO₂e or 23.3% in 2018. The Kildare CC Climate Action Plan (2024-2029) aims to create a cleaner, greener, and more resilient county. The Climate Action Plan has specific actions that have either been delivered, are in development stage or drafted for the future implementation. For instance, Kildare CC are also assisted by the Office of Public Works on flood alleviation schemes.

The Kildare CC Climate Adaptation Strategy (Kildare County Council 2019) includes 121 adaptation measures to deliver across six significant goals to mitigate climate change. The delivery of these goals varies between 1-5 years contingent on the aim. The strategy, spanning from 2019 to 2024, focuses on ensuring a proper comprehension of the key risks and vulnerabilities of climate change, implementing climate-resilient actions in a planned and proactive manner, and mainstreaming climate adaptation considerations into all plans and policies.

The Applicant also aims to support national, regional, and local climate policy. All of the Applicants new homes are in accordance with the RIAI climate change targets, and they ensure reduced levels of embodied carbon in each of the houses built. The Applicant are on a mission to create net zero carbon homes in the future, to ensure they are playing their part to reduce carbon emissions, but to also disrupt and challenge the industry to be more sustainable. They are the first and only Irish housebuilder to be Global Real Estate Sustainability Benchmark (GRESB) accredited, demonstrating their commitment to create sustainable homes for their customers.

The key components of the Applicants ESG Policy on Environmental Sustainability are as follows:

- Build very energy efficient houses
- Built the largest award winning certified Passive House development in Ireland
- R&D programme to achieve continuous improvement in our designs and building methods to reduce CO₂ emissions
- All housing is wired ready for EV chargers, solar PV
- Transitioned electricity supply to 100% renewable electricity for head office and all construction sites
- Replaced 750 000km of diesel car use with full EV Vehicles. The target for full fleet transition by 2025
- Design low carbon developments in all aspects of design, construction and waste management
- Water conserving low flow plumbing fittings are installed as standard
- Waste segregation on site
- Waste reduction management plan
- Developments use excavated soil on site in recreational areas

11.1.3.7 Guidance

The assessment has referred to national guidelines, where available, in addition to international standards and guidelines relating to the assessment of GHG emissions and associated climatic impact. These are summarised below:

- 2030 Climate and Energy Policy Framework (European Commission, 2014)
- 2030 EU Climate Target Plan (European Commission, 2021b)
- Assessing GHG Emissions and Evaluating their Significance (Institute of Environmental Management & Assessment (IEMA), 2022)
- Carbon Management in Infrastructure (European Commission, 2013)
- Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) (Government of Ireland, 2021)
- Climate Action Plan 2025 (Government of Ireland, 2025)
- Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 Climate (UK Highways Agency, 2019)
- Department of Housing, Planning, and Local Government. Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018)
- European Commission. Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (2013)
- European Commission. Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (2021a)
- IEMA. EIA Guide to: Climate Change Resilience and Adaptation (2020a)
- IEMA. GHG Management Hierarchy (2020b)
- IEMA. Environmental Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance (2022)
- Irish Green Building Council, Land Development Agency (LDA), and Environmental Protection Agency (EPA). The Carbon Designer for Ireland Tool
- Publicly Available Specification (PAS) 2080: 2016
- Transport Infrastructure Ireland (TII). GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document (2022c)
- Transport Infrastructure Ireland (TII). GE-GEN-01101: Guide to the Implementation of Sustainability for TII Projects (2023)
- Transport Infrastructure Ireland (TII). PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (2022a)
- Transport Infrastructure Ireland (TII). PE-ENV-01105: Climate Assessment Standard for Proposed National Roads (2022b)
- Integrating Climate Change into Strategic Environmental Assessment in Ireland – A Guidance Note (EPA, 2015)

11.2 STUDY METHODOLOGY

Climate change is recognised as one of the most serious global environmental problems and arguably the greatest challenge facing humanity today. While natural variations in climate over time are normal, anthropogenic activities have interfered greatly with the global atmospheric system by emitting

substantial amounts of greenhouse gases (GHGs). This has caused a discernible effect on our global climate system, with continued change expected due to current and predicted trends of GHG emissions. In Ireland this is demonstrated by rising sea levels, changes in the ecosystem, and extreme weather events.

Carbon dioxide (CO₂) emissions have a global climate warming effect. This is regardless of rate of release, location or the weather when released into the atmosphere. This is unlike pollutants that affect local air quality where the rate of release, location and prevailing weather, as well as the amount of pollutant, determines the local concentrations and the impact. Local ambient concentrations of CO₂ are not relevant for climate change and there are no limits or thresholds that can be applied to particular sources of carbon emissions. Any amount of CO₂ released into the atmosphere will contribute to climate warming, the extent of which is determined by the magnitude of the release. Although CO₂ emissions are typically expressed as kilogrammes or tonnes per year, there is a cumulative effect of these emissions because CO₂ emissions have a warming effect which lasts for 100 years or more.

In this regard, the methodology adopted in this chapter covers two separate assessments – a greenhouse gas assessment (GHGA) and a climate change risk assessment (CCRA).

- Greenhouse Gas Emissions Assessment (GHGA) – This evaluation estimates the greenhouse gas emissions generated by a project throughout its entire lifespan. It then compares these emissions against pertinent Irish carbon budgets, targets, and policies to help gauge their significance.; The Transport Infrastructure Ireland (TII) Carbon assessment tool and the Irish Green Building Councils (IGBC) Lifecycle Assessment Tool have been used for this assessment and
- Climate Change Risk Assessment (CCRA) – This analysis examines how a changing climate could affect a project and its surrounding environment. The assessment considers a projects vulnerability to climate change and identifies adaptation measures to increase project resilience.

Further details on the methodologies undertaken are presented in the following sections.

11.2.1 Desk Surveys

A desktop study involving various national and international documents on climate change and analysis of synoptic meteorological data from the nearest Met Eireann station (Casement Aerodrome) was also carried out in order to compile this report. Attention has been focused on Ireland's obligations under the Paris Agreement in the context of the overall climatic impact of the presence and absence of the Proposed Development.

This analysis was undertaken by means of a desktop assessment based on available relevant guidance and information sources, and with reference to other chapters of this EIAR.

The following information sources have been consulted in relation to the assessment of climate aspects for the proposed Project:

- Key material, resource and cut/fill balance inputs from the description of the proposed Project presented in Project Description and Construction Strategy of this EIAR;
- Traffic figures from Traffic and Transportation;
- Building Lifecycle and Energy Report findings;

- Site Specific Flood Risk Assessment
- Estimates of likely waste volumes from the description of the proposed Project presented in Project Description, Construction Strategy, Land and Soils and Resource and Waste Management of this EIAR; and
- Environmental Protection Agency (EPA) Greenhouse Gas Emissions Inventories and Projections.

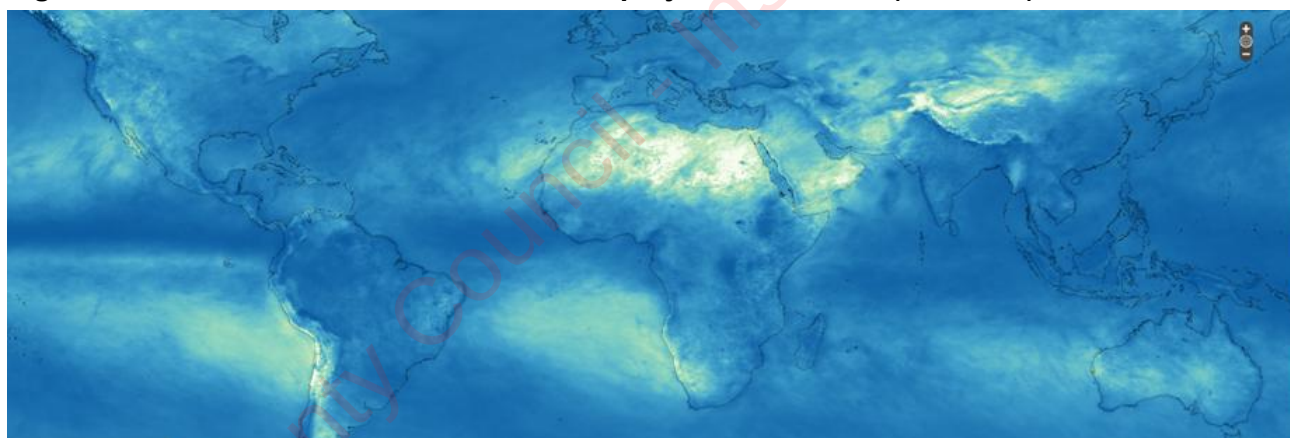
11.2.2 Climatics

Summary of the Approach

This DNV assessment was primarily based on the on-site climate risk projections generated CMIP5/CMIP6 climate model. The tool is typically used in combination with multiple Shared Socio-economic pathways/ Representative Concentration Pathways (SSPs/RCPs), which represent different future greenhouse gas concentration trajectories developed by the International Panel on Climate Change. The assessment was undertaken for two representative scenarios SSP1-2.6/RCP 4.5 and SSP5-8.5/RCP 8.5:

- SSP1-2.6/RCP 4.5 (transition from 2030) – this scenario leads to global warming exceeding 2 °C by 2100 but remaining below 3 °C. It is described as an intermediate scenario; and
- SSP5-8.5/RCP 8.5 (business as usual) – this scenario leads to global warming significantly exceeding 3 °C by 2100 and is generally taken as the basis for the worst-case climate change scenarios.

Figure 11.3: multi-model ensembled rainfall projection for 2050 (SSP5-8.5)



We combine the global data from multiple IPCC models (ACCESS, GFDL-ESM4, HadGEM) to address the model uncertainty. Figure 11.3 showcases the multi-model ensembled of rainfall projection for 2050 under SSP5-8.5 scenario. Through DNV's proprietary method, we downscale and refine the global data to a 5km grid resolution for various regions like Australia, Contiguous United States (CONUS), Europe, and the United Kingdom. Leveraging these refined datasets, we can assess multi-hazard risk exposure for assets and portfolios across different geographical areas.

Table 11.1: Assessment of Climate Risk Indices

Category	Hazard
Temperature related indices	Surface temperature
	Warm Days

	Fire Weather Days
	Heat Stress Index
Rainfall related extremes	Precipitation
	Heavy Precipitation Days
	Extreme Precipitation Days
	Flood Events
Aridity/Drought conditions	Water stress
Irradiance at surface	Surface reading solar radiation
Cloud related	Cloud cover
Wind extremes	Wind speed
	Storm wind speed
Subsidence and landslide	Subsidence susceptibility index
	Landslide
Hailstorm	Hailstorm frequency
Lightning	Lightning density

11.2.3 Field Surveys

No site-specific baseline surveys were undertaken as part of the assessment for climate. The baseline data presented in this section is derived from the EPA Projections and Met Éireann monitoring network and may be taken as representative of the background climate within the Study Area.

11.2.4 Assessment Methodology

11.2.4.1 Key Parameters for Assessment

This assessment has been undertaken in line with the Institute of Environmental Management and Assessment (IEMA) guide 'Assessing Greenhouse Gas Emissions and Evaluating their Significance', 2nd Edition, 2022. The following aspects of the proposed Project are assessed in this chapter:

- Potential direct greenhouse gas (GHG) emissions associated with the construction of the proposed Project – this includes site clearance, embodied carbon, material transport, construction activities and waste management.
- Potential changes in GHG emissions associated with emissions during the operational phase of the proposed Project; and
- Vulnerability of both the construction and operational phases of the proposed Project to climate change.

11.2.4.2 GHG Appraisal Method - Construction Phase (Including Material Delivery and Spoil Removal)

The GHG assessment accounts for various components relating to the project during different life stages to determine the total impact of the development on climate. The building life expectancy for the purposes of the assessment is 50 years, typical for this type of development. GHG emissions are attributed to four main categories, taken from BS EN 15978. These categories are:

- **Production Stage (Embodied carbon);** The carbon emissions at this stage originate from the extraction of raw materials, their transportation to manufacturing sites, and the primary energy consumed (along with the associated carbon impacts) during the conversion of these raw materials into construction products. These phases have been included in the scope of this assessment, and relevant information has been integrated into the TII tool (TII, 2022).
- **Pre-construction/Construction Stage;** These carbon impacts stem from the delivery of construction products to the site and their subsequent processing and assembly into the building. This aspect has been incorporated into the assessment's scope.
- **Operational Stage:** This encompasses a broad range of sources, including greenhouse gas emissions from building operations (energy), maintenance, and replacement which have been included in this assessment.
- **End of Life Stage:** The sustainable deconstruction and disposal of the existing building at the end of its life (Approx 50 years) consider the activities carried out by demolition contractors on-site. However, no credit is given for potential future carbon benefits from reusing or recycling materials into new products. This stage is not included in the scope of this study due to the variability and uncertainty surrounding deconstruction methods that may be employed at the end of the development's lifespan.

Information and data from the building lifecycle report, building energy ratings and energy statement have been utilised for this chapter.

Nearly Zero Energy Buildings' (NZEB) means a building that has a very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby. Non-residential building information.

The Non-Domestic Energy Assessment Procedure (NEAP) is Ireland's official methodology for calculating a Building Energy Rating (BER) for non-domestic buildings. BER assessors use the NEAP software tool and guidance manuals to publish non-domestic Building Energy Rating (BER) certificates and advisory reports and to demonstrate compliance with Part L of the building regulations. The NEAP software calculates the energy consumption and carbon dioxide emissions of a building. It considers space heating and cooling, water heating, ventilation and lighting information.

Simplified Building Energy Model (SBEMie) or other approved software can be utilised to publish non-domestic BERs and demonstrate compliance with Part L.

Primary energy use and the associated carbon dioxide emissions are calculated using the Non-Domestic Energy Assessment Procedure (NEAP) and these parameters must not exceed specified target values.

To achieve NZEB compliance for primary energy use, the energy performance coefficient (EPC) of a building must be no greater than the Maximum Permitted Energy Performance Coefficient (MPEPC), which is 1.0.

An acceptable carbon dioxide emissions rate for NZEB compliance is achieved if the calculated carbon performance coefficient (CPC) is no greater than the Maximum Permitted Carbon Performance Coefficient (MPCPC), which is 1.15.

In terms of reporting units, all units are in equivalent kilograms of carbon dioxide – hereafter kg CO₂eq. Equivalent kilograms of carbon dioxide (kg CO₂eq) are used as a standardised unit for numerous greenhouse gases such as methane and nitrous oxide. Summary data is presented as tonnes of CO₂eq for ease of reference of this data.

Residential building information

The Dwelling Energy Assessment Procedure (DEAP) is used by BER assessors to calculate the energy performance and carbon dioxide emissions of a home's space heating, water heating, ventilation, and lighting. DEAP consists of a software tool and guidance manuals. BER Assessors use DEAP to publish Building Energy Rating (BER) certificates and advisory reports for homes. DEAP is also the compliance tool specified in Part L of the Irish Building Regulations.

The DEAP software is web-based and used to calculate the annual delivered energy consumption, primary energy consumption (kWh/m²/year) and carbon dioxide emissions (kgCO₂/m²/y) for standardised occupancy. For all new builds, NZEB is equivalent to a 25% improvement in energy performance on the 2011 Building Regulations. Key changes to Part L for NZEB compliance include a Maximum Energy Performance Coefficient of 0.3, a Maximum Carbon Performance of 0.35 and a renewable Energy Ratio of 20%.

The project design team have also utilised the Irish Green Building Councils (IGBC) Carbon Designer tool for Ireland. The Irish Green Building Council, in collaboration with One Click LCA Ltd., have developed the Carbon Designer for Ireland tool specifically for Irish building projects. Endorsed by the EPA and the Land Development Agency, this tool is compliant with standards such as EN 15978, ISO 21931-1, ISO 21929, and the data requirements of ISO 14040 & EN 15804. It is also aligned with LEED, BREEAM, and PAS 2080. The tool enables users to evaluate the carbon footprint of buildings in the early stages by using typical default materials and values. Users input details such as gross floor area, number of stories, and building frame type.

After establishing a baseline with generic data, the tool facilitates the exploration of various options and the optimisation of carbon impacts. It identifies the most carbon-intensive elements within the building and suggests alternatives with lower carbon footprints. This provides a high-level initial assessment of the lifecycle carbon for the development based on basic information and default values with the option to edit these defaults as required to reduce impacts.

The primary factor in reducing climate impact is the extent of proposed mitigation. Thus, using construction materials with lower carbon intensity can help reduce climate effects. This assessment aims not for perfection but to identify areas with significant carbon impact. We can then explore potential mitigation measures to reduce this impact. Outputs from the IGCB tool have been reviewed and implemented where relevant to reduce the climate impact of the Proposed Development.

Transport Infrastructure Ireland's (TII) proprietary carbon tool has been used to quantify carbon emissions from non-building elements such as material delivery, spoil removal, roads, and infrastructure. The carbon tool is a spreadsheet-based product, developed by TII, with the goal of identifying, estimating and mitigating greenhouse gas emissions that accrue on large road and rail infrastructure projects. The carbon tool is closely aligned with guidance set out in PAS 20803 which suggests a modular structure for capturing and reporting carbon emissions according to lifecycle phase. Where the exact material needed

isn't listed an estimate to a similar material type has been used. The construction waste and construction traffic information were reviewed from the traffic and waste chapters.

Design data for materials, earthworks and transport distances are based on input data from the design team. Where detailed designs are not available for various parts of the project, assumptions are made based on industry best practice and default values in the carbon tool. In particular, transport distances for materials have been estimated, as no specific suppliers have been selected at this early stage of the proposed Project. This allows for an estimate of transport emissions, using an emissions factor for kg CO₂eq/km in the carbon tool.

The use of the TII Carbon Tool was not considered suitable for the building elements of the Proposed Development. As the TII Carbon Tool was developed for road and infrastructure projects, the material types within the tool are specific to these types of developments. These material types are not fully appropriate for assessing the embodied carbon associated with the construction of buildings. Therefore, the carbon impact of the buildings was carried out using an alternative tool; the Carbon Designer for Ireland tool. The IGBC tool in combination with BER/NEAP assessments have been used for the building and operational carbon assessment.

11.2.4.3 GHG Appraisal Method - Operational Phase

Traffic Emissions

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 by reference to EPA data on annual GHG emissions (see Section 11.3 below). Thereafter the impact of the Proposed Development on climate is determined. Emissions from road traffic associated with the Proposed Development have the potential to emit carbon dioxide (CO₂) which will impact climate.

The UK Highways Agency has published an updated DMRB guidance document in relation to climate impact assessments LA 114 Climate (UK Highways Agency, 2019). The following scoping criteria are used to determine whether a detailed climate assessment is required for a proposed project during the operational stage. During the operational phase, if any of the road links impacted by the Proposed Development meet the below criteria then further assessment is required.

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

The Proposed Development will result in the operational phase traffic increasing by more than 1,000 AADT on two road links.

As a result, a detailed assessment of traffic related CO₂ emissions was conducted. PE-ENV-01104 (TII, 2022a) advises that road traffic related emissions information should be obtained from an Air Quality Practitioner to show future user emissions during operation without the development in place. The DNV Air Quality Practitioner calculated the traffic related emissions through the use of the TII 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 CO₂eq for the Opening Year 2028 and Design Year 2043. 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 obtained from Traffic Consultants for the purpose of this assessment. Inputs include light-duty vehicle (LDV) annual average daily traffic movements (AADT), annual average daily heavy-duty vehicles (HDV AADT), annual average traffic speeds, road link lengths, road type and project county location. Further details are provided in Chapter 10 'Air Quality'.

Operational GHG Emissions

The EU guidance (2013) also states indirect GHG emissions as a result of a 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 to 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.

The Energy Statement prepared by Fallon Design (2025), building lifecycle report and IGBC outputs in relation to this assessment has been reviewed and used to inform the operational phase climate assessment. This report outlines several measures in relation to energy usage from the Proposed Development primarily in relation to heat and electricity. Several measures have been incorporated into the overall design of the development to reduce the impact to climate where possible, in line with the objectives of the IEMA guidance (2022).

11.2.4.4 Assessment Criteria for GHG Emissions

After the publication of the 2021 Climate Amendment Act in July 2021 and the 2021 CAP, the carbon budgets were approved and a series of sectoral emissions ceiling were published, including sectoral emissions ceilings for the residential sector (DECC, 2021). These ceilings will allow a comparison with the net CO₂ projected GHG emissions from the Project.

The IEMA Climate Change principles (IEMA, 2020) document provides a section on how to assess GHG emissions in EIA and states:

- "When evaluating significance, all new GHG emissions contribute to a significant negative environmental effect; however, some projects will replace existing development that have higher GHG profiles. The significance of a project's emissions should therefore be based on its net impact, which may be positive or negative.
- "Where GHG emissions cannot be avoided, the EIA should aim to reduce the residual significance of a project's emissions at all stages."
- "Where GHG emissions remain significant but cannot be farther reduced... approaches to compensate the project's remaining emissions should be considered."

The process for determining the significance of effects involves two key steps: first, defining the magnitude of the impacts, and second, evaluating the sensitivity of the receptors (e.g., Ireland's National GHG targets). Although there are no specific project criteria for climate assessment, the project will be

evaluated using the recommended IEMA significance determination approach. This evaluation will account for any embedded or planned mitigation measures included in the project design (IEMA, 2020).

According to LA 114, professional judgment is essential when contextualizing and assessing the significance of a project's GHG impact. In alignment with IEMA Guidance, LA 114 emphasises that the core of assessing significance is not just whether a project emits GHGs or the magnitude of these emissions alone, but rather whether the project helps reduce GHG emissions compared to a baseline that aligns with a net zero trajectory by 2050 (UK Highways Agency, 2019).

Significance determination for emissions generated by the project in this assessment is based on the criteria presented in Table 11.2 as guided by IEMA in addition to the following two factors:

- The extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050; and
- The level of mitigation taking place.

Table 11.2: Definition of Climate Significance

Magnitude of Impact	Description
Major or Moderate Adverse (i.e. significant)	A project that follows a 'business-as-usual' or 'do minimum' approach and is not compatible with the net zero trajectory by 2050 or sectoral based transition to net zero targets, results in a significant adverse effect. It is down to the consultant completing the assessment to differentiate between the 'level' of significant adverse effects, e.g. 'moderate' or 'major' adverse effects. A project's impact can shift from significant adverse to non-significant effects by incorporating mitigation measures that substantially improve on business-as-usual and meet or exceed the science-based emissions trajectory of ongoing but declining emissions towards net zero. Meeting the minimum standards set through existing policy or regulation cannot necessarily be taken as evidence of avoiding a significant adverse effect. This is particularly true where policy lags behind the necessary levels of GHG emission reductions for a science based 1.5°C compatible trajectory towards net zero.
Minor Adverse (i.e. not significant)	A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve an impact that has a minor adverse effect but is not significant. The project may have residual impacts but is doing enough to align with, and contribute to, the relevant transition scenario. A 'minor adverse' or 'negligible' non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral (i.e. zero on balance) but refers to the likelihood of avoiding severe climate change and achieving net zero by 2050. A 'minor adverse' effect or better is a high bar and indicates exemplary performance where a project meets or exceeds measures to achieve net zero earlier than 2050.
Negligible	A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and

	emerging policy compatible with that trajectory, and has minimal residual emissions, is assessed as having a negligible effect that is not significant.
Beneficial	A project that achieves emissions mitigation that goes substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with that trajectory, and has minimal residual emissions, is assessed as having a negligible effect that is not significant.

Ireland's carbon budgets provide a framework for understanding the significance of GHG emissions from the Proposed Development. This involves comparing the anticipated net GHG emissions of the development with the established carbon budgets. With the introduction of the Climate Action Act in 2021 and the Climate Action Plan 2025, sector-specific carbon budgets have been outlined for comparison with the development's net GHG emissions over its lifecycle. For the Transport sector, which emitted approximately 12 MtCO₂e in 2018, the budget has a 2030 cap of 6 MtCO₂e, reflecting a 50% reduction. Similarly, the Industry sector, with 2018 emissions of about 7 MtCO₂e, has a 2030 ceiling of 4 MtCO₂e, indicating a 35% reduction (see Table 11.3).

11.2.4.5 Climate Change Risk Assessment-Criteria for Climate Vulnerability

Climate change risk assessment is a risk assessment-based methodology for identifying potential climate impacts and assessing their severity. Carrying out a climate change risk assessment, at the simplest level, can be summarised into the following steps:

- identifying potential climate change risks to a scheme or project.
- assessing these risks (potentially prioritising to identify the most severe); and
- formulating mitigation actions to reduce the impact of the identified risks.
-

Any assessment of risk includes assessing the likelihood (or probability) and magnitude (or severity) of the impacts identified. This method is widespread within the climate change resilience assessments carried out by projects and cities to date.

The risk assessment assesses the likelihood and consequence of the impact occurring to each receptor, leading to the evaluation of the significance of the impact and the vulnerability of the Proposed Development to various climate hazards. The vulnerability is determined by combining the sensitivity and the exposure of the Proposed Development to various climate hazards.

To evaluate the likelihood of climate risk, we have utilised the baseline environmental information provided in Section 11.3, future climate change models, and insights from other experts involved in the Proposed Development (e.g., hydrologists and traffic consultants).

Initially, a preliminary Climate Change Risk Assessment (CCRA) focusing on the operational phase is performed, following the TII guidance PE-ENV-01104 (2022). This involves assessing the sensitivity of the development assets (i.e., receptors) and their exposure to climate change hazards. Each asset category within the Proposed Development must be assigned a level of sensitivity to climate hazards. PE-ENV-01104 outlines the asset categories and climate hazards that should be considered.

The specific asset categories will differ depending on the type of development and need to be determined on a case-by-case basis.

- **Asset Categories** Pavements; drainage; structures; utilities; landscaping; signs, light posts, buildings, and fences.
- **Climate Hazards** Flooding (coastal, pluvial, fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning and hail; landslides; fog.

The sensitivity is based on a High, Medium or Low rating with a score of 1 to 3 assigned as per the criteria below.

- **High Sensitivity** The climate hazard will or is likely to have a major impact on the asset category. This is a sensitivity score of 3.
- **Medium Sensitivity** It is possible or likely the climate hazard will have a moderate impact on the asset category. This is a sensitivity score of 2.
- **Low Sensitivity** It is possible the climate hazard will have a low or negligible impact on the asset category. This is a sensitivity score of 1.

Once the sensitivities have been identified the exposure analysis can be completed. The exposure analysis involves determining the level of exposure of each climate hazard at the project location irrespective of the project type for example: flooding could be a risk if the project location is next to a river in a floodplain. Exposure is assigned a level of High, Medium or Low as per the below criteria.

- **High Exposure** It is almost certain or likely this climate hazard will occur at the project location i.e. might arise once to several times per year. This is an exposure score of 3.
- **Medium Exposure** It is possible this climate hazard will occur at the project location i.e. might arise a number of times in a decade. This is an exposure score of 2.
- **Low Exposure** It is unlikely or rare this climate hazard will occur at the project location i.e. might arise a number of times in a generation or in a lifetime. This is an exposure score of 1.

Once the sensitivity and exposure are categorised, a vulnerability analysis is conducted by multiplying the sensitivity and exposure to calculate the vulnerability.

Vulnerability = Sensitivity x Exposure

The vulnerability assessment takes any proposed mitigation into account. Table 11.4 details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale. Where residual medium or high vulnerabilities exist, the assessment may need to be progressed to a detailed climate change risk assessment and further mitigation implemented to reduce risks.

According to TII guidance and EU technical guidance, if all identified vulnerabilities are reasonably ranked as low, a detailed climate risk assessment may not be necessary. In such cases, the impact of climate change on the development would be deemed insignificant.

However, if there are residual medium or high vulnerabilities, a more detailed climate change risk assessment may be required, along with the implementation of additional mitigation measures to address the risks. The TII guidance specifies that a construction phase Climate Change Risk Assessment (CCRA) is only required if a detailed CCRA is deemed necessary.

Table 11.4: Vulnerability Matrix

	Exposure			
Sensitivity		High (3)	Medium (2)	Low (1)
	High (3)	9- High	6- High	3- Medium
	Medium (2)	6- High	4- Medium	2- Low
	Low (1)	3- Medium	2- Low	1- Low

The vulnerability conclusions for each impact are based on, and incorporate, confirmed design and mitigation measures. Where the assessment concludes that the impact remains high, the project team may need to identify additional adaptation/EIA mitigation measures.

The screening CCRA, detailed in Section 11.3.3., did not identify any residual medium or high risks to the Proposed Development as a result of climate change. Therefore, a detailed CCRA for the construction and operational phase were scoped out.

While a CCRA for the construction phase was not required, best practice mitigation against climate hazards is still recommended in Section 11.8.

11.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

11.3.1 Existing GHG Emissions Baseline

In 2023, Ireland's GHG emissions are estimated to be 55.01 million tonnes carbon dioxide equivalent (Mt CO₂eq), which is 6.8% lower (or 4.00 Mt CO₂eq) than emissions in 2022 (59.00 Mt CO₂eq) and follows a 2.0% decrease in emissions reported for 2022. Emissions are 1.2% below the historical 1990 baseline for the first time in 33 years (EPA, 2024).

Climate impacts are evaluated at a national level, considering national targets and sectoral emission ceilings. The study area for climate assessments is the Republic of Ireland, with the baseline established in the context of this geographic focus.

In 2023 emissions in the stationary ETS1 emissions decreased (17%) and emissions under the ESR (Effort Sharing Regulation) decreased (3.4%). When LULUCF is included, total national emissions decreased by 3.8% (EPA, 2024).

Decreased emissions in 2023 compared to 2022 were observed in the largest sectors except for transport which showed an increase of 0.3% shown highlighted red in the "Emissions change 2022-2023" table 11.5 below (EPA, 2024). Climate impacts are evaluated at a national level, considering national targets and sectoral emission ceilings. The study area for climate assessments is the Republic of Ireland, with the baseline established in the context of this geographic focus.

The table shows that the residential sector accounted for 5.3 Mt CO₂eq in 2023.

Table 11.5: Emissions change 2022-2023 Ireland.

Mt CO ₂ eq	2022	2023	% Change
Agriculture	21.782	20.717	-4.9%

Transport	11.759	11.798	0.3%
Energy Industries	10.003	7.860	-21.4%
Residential	5.753	5.347	-7.1%
Manufacturing Combustion	4.356	4.152	-4.7%
Industrial Processes	2.294	2.155	-6.1%
F-Gases	0.719	0.675	-6.0%
Commercial Services	0.734	0.715	-2.6%
Public Services	0.690	0.671	-2.7%
Waste	0.870	0.844	-3.0%
LULUCF	3.655	3.895	6.5%
Total excluding LULUCF	58.960	54.934	-6.8%
Total including LULUCF	62.616	58.829	-6.0%

Emissions per capita decreased from 11.31 tonnes CO₂eq/person in 2022 to 10.34 tonnes CO₂eq/person in 2023. Ireland's average tonnes of GHG/capita over the last ten years were 12.08 tonnes. With CSO 2023 census data showing a population of 5.28 million people and with population projected to increase to 5.67 million in 2030, 6.05 million in 2040 and 6.33 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 5 million tonnes of CO₂eq annually (EPA, 2025).

The EPA also publishes GHG emission projections to 2055. Table 11.6 shows that in the WAM scenario the percentage reduction is not achieved for electricity, transport, industry, agriculture and other (comprises of waste, fluorinated-gases and petroleum refining). Looking at the overall percentage emissions reduction target of -51% by 2030 compared to 2018, the projections are indicating a significant shortfall with only a -29% reduction achieved thus predicting that Ireland will not achieve its legally binding climate target (EPA, 2024).

Table 11.6: Assessment of Achievement of Sectoral Percentage Targets under the With Additional Measures scenario (EPA)

Sector	Emissions 2018 (Mt CO ₂ eq)	Projected Emissions 2030 (Mt CO ₂ eq)	Percentage Change 2030 vs 2018	Target Reduction 2030 vs 2018	Percentage Change (Reported in 2024) 2030 v 2018
Electricity	10.2	3.1	-0.7	-75%	-0.66
Transport	12.3	9.7	-0.21	-50%	-0.29
Buildings (Residential)	7	5.4	-0.22	-40%	-0.4
Buildings (Commercial & Public)	1.5	1	-0.36	-45%	-0.6
Industry	7	6.1	-0.12	-35%	-0.24
Agriculture	21.4	18	-0.16	-25%	-0.18
Other	2.1	1.6	-0.25	-50%	-0.25
LULUCF*	4	5.5	0.39	N/A	0.17

(no ceiling currently)					
Total with LULUCF	65.6	50.6	-0.23	-51%	0.29

*A direct comparison of emissions in the agriculture sector against its Sectoral Emission Ceilings is no longer viable.

** Waste, F-gases and Petroleum Refining

***National objective includes LULUCF

11.3.2 Future GHG Baseline

In line with TII and IEMA Guidance the future baseline is a trajectory towards net zero by 2050, “whether it [the project] contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050” (IEMA, 2022). The future baseline for GHG emissions assessment will be considered in relation to the future Irish climate targets which the assessment results will be compared against.

The future baseline will be based on Ireland achieving the targets outlined in the Climate Action Plan 2025 (CAP25) and subsequent Climate Action Plans, as well as meeting binding EU targets for 2030. In order to meet the commitments under the Paris Agreement, the European Union (EU) enacted ‘Regulation (EU) 2018/842 on binding annual GHG 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’ (hereafter referred to as 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. The Regulation was amended in April 2023 and Ireland must now limit its greenhouse gas emissions by at least 42% by 2030. The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing and heavy industry. The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS scheme and thus includes GHG emissions from transport, residential and commercial buildings and agriculture.

11.3.3 Current CCRA Baseline

Impacts to the proposed Project as a result of climate change involve increases in temperatures and increases in the number of rainfall days per year. Ireland has observed increases in the annual rainfall in the north and west of the country, with small increases or decreases in the south and east including in the region where the proposed Project will be located. The EPA (2021) has compiled a list of potential adverse impacts as a result of climate change including the following which may be of relevance to the proposed Project:

- Increase of 1 to 4 degrees Celsius in average temperature;
- More intense storms and rainfall events;
- Increased likelihood and magnitude of river and coastal flooding;
- Water shortages in summer in the east;
- Adverse impacts on water quality; and
- Changes in distribution of plant and animal species

The proposed Project area experiences a temperate, maritime climate, resulting in mild winters and cool summers. The Met Éireann weather station at Casement Aerodrome, County Dublin, is the nearest weather and climate monitoring station to the proposed Project that has meteorological data recorded for the 30-year period from 1991 to 2020 (Met Éireann, 2023). The monitoring station is located approximately 12km south of the proposed Project at its nearest point (Railpark). Meteorological data recorded at Casement Aerodrome over the 30-year period from 1991 to 2020 indicates that the wettest months were October and November, and the driest month on average was March. July was the warmest month with a mean temperature of 19.8°C.

Met Éireann recent weather patterns were analysed, they highlight a marked rise in both the frequency and intensity of storms. Notable examples include Storm Darwin in February 2014, Storm Emma in March 2018, Storm Ophelia in October 2018, and Storm Éowyn in January 2025. During Storm Ophelia, Casement Aerodrome recorded its highest wind gust, reaching 117 km/h, with a sustained 10-minute wind speed of 85 km/h.

Annual rainfall from 1989 to 2018 was 6% higher compared to the 30-year period from 1961 to 1990. On 24 October 2011, Casement Aerodrome recorded 76.5 mm of rainfall over a 9-hour span, an event with an annual probability of once in 60 years. As rainfall has increased in Ireland, recent years have seen more intense historical precipitation events, such as the heavy rainfall and flooding in the summer of 2008, severe flooding in November 2009, and the heavy rainfall in the Greater Dublin Area on 24 October 2011. The latest data from Met Éireann's 'The Status of Irish Climate 2020 Report' highlights that the 10-year period from 2006-2015 was the wettest recorded decade (Met Éireann, 2021).

Met Éireann's 2024 Climate Statement states 2024's average shaded air temperature in Ireland is provisionally 10.72 °C, which is 1.17°C above the 1961-1990 long-term average. This makes 2024 the fourth warmest year on record, 0.49 °C cooler than 2023, the warmest year on record. The five warmest years on record are 2023, 2022, 2007, 2024 and 1945. Seven of the top ten warmest years have occurred since 2005. (Met Éireann, 2024).

In 2024, Ireland experienced below-average rainfall, including the warmest May on record. Since April 2023, record-high sea surface temperatures (SST) were observed, with a severe marine heatwave affecting the western coast of Ireland in June 2023. This marine heatwave contributed to the unprecedented rainfall in July 2023 (Met Éireann, 2024).

Recent weather patterns and extreme weather records from Met Éireann have been examined. Given the exceptional data from 2023, Met Éireann notes that current Irish climate projections predict continued warming, including milder winters. The record temperatures increase the likelihood of extreme weather events, leading to longer dry periods and heavier rainfall. Additionally, sea level rise is expected to cause more storm surges and coastal flooding, with an increase in compound events where coastal surges and extreme rainfall occur simultaneously. While Met Éireann is confident that maximum rainfall rates will rise, there is less certainty about how the frequency or intensity of storms will change with climate change.

Surface air temperature plays a crucial role in climate analysis, influencing ecosystems, livelihoods, and human activities. Changes in temperature affect various sectors, including health, agriculture, and energy demand. In Ireland, over a century of consistent temperature measurements is available. Globally, the average surface air temperature has increased by 0.85°C over the past 100 years, with the rate of warming nearly doubling since 1975, reaching an equivalent of a 1.65°C rise per century. The five warmest years on record globally were 2015–2019, which is notable since temperature records began in

the mid to late 1800s. Hotter, drier summers and milder, wetter winters are now more common in many parts of the world (Met Éireann 2020).

11.3.4 Future CCRA Baseline

The EPA-funded research project 'Ensemble of Regional Climate Model Projections for Ireland Report No. 159' (EPA 2015) forecasts significant reductions in mean annual, spring, and summer precipitation, with longer dry spells expected. By 2050, the most pronounced decreases are projected for summer, with reductions ranging from 0% to 13% under medium-to-low emission scenarios and 3% to 20% under high emission scenarios. In contrast, heavy precipitation during winter and autumn is expected to increase by up to 20%. Additionally, the number of extended dry periods during autumn and summer is anticipated to rise considerably by mid-century.

The report suggests that the total number of North Atlantic cyclones is expected to decrease by 10%, along with a reduction in average mean sea-level pressure of 1.5 hectopascals (hPa) across all seasons by mid-century. Wind energy is anticipated to decline in spring, summer, and autumn, with an increase expected in winter. Additionally, the predicted rise in extreme storm activity could negatively impact future wind energy supply.

The EPA's State of the Irish Environment Report (Chapter 2: Climate Change) further highlights that projections indicate that the comprehensive implementation of additional policies and measures from the 2019 Climate Action Plan could reduce Ireland's total GHG emissions by up to 25 percent by 2030 compared to 2020 levels. Climate change is already a current issue in Ireland, with a temperature increase of approximately 0.8°C since 1900. The report further highlights the importance of strong public sector climate leadership and the rapid acceleration of decarbonisation efforts if we are to halt the climate crisis (EPA, 2020).

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

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

Concentration trajectories known as Representative Concentration Pathways (RCPs) were utilised in EPA Research Report No.339 High resolution Climate Projections for Ireland – A Multi-model Ensemble Approach (EPA 2020). For the EPA study, two RCPs were chosen, RCP4.5 and RCP8.5. RCP4.5 is considered an intermediate scenario, while RCP8.5 is considered to be representative of a potential worst-case scenario.

The future climate was modelled using both the Representative Concentration Pathway 4.5 (RCP4.5) (medium-low) and RCP8.5 (high) scenarios. The study suggests that by mid-century (2041–2060), average annual temperatures are projected to rise by 1–1.2°C under RCP4.5 and 1.3–1.6°C under RCP8.5, with the most significant increases in the east. Temperature extremes are expected to become more pronounced, with summer daytime and winter night-time temperatures increasing by 1–2.4°C. The number of frost and ice days is projected to decrease by approximately 50%. Summer heatwaves are likely to become more frequent, especially in the south. Additionally, precipitation is expected to become more variable, with a significant increase in both dry periods and heavy rainfall events.

Established in June 2022, the National Framework for Climate Services (NFCS) aims to streamline the provision of climate services in Ireland and will be led by Met Éireann. The NFCS is designed to facilitate the co-production, delivery, and utilization of precise, actionable, and accessible climate information and tools to enhance climate resilience planning and decision-making. In parallel with the NFCS, ongoing research is being conducted through the TRANSLATE project. This initiative, led by climate researchers from the University of Galway's Irish Centre for High End Computing (ICHEC) and University College Cork's SFI Research Centre for Energy, Climate, and Marine (MaREI), with support from Met Éireann climatologists, is focused on advancing climate science. TRANSLATE generates outputs using internationally reviewed models from CORDEX and CMIP5, with Representative Concentration Pathways (RCPs) offering a range of possible futures based on different human activity scenarios.

TRANSLATE offers the first standardised and bias-corrected national climate projections for Ireland, designed to support climate risk decision-making across various sectors, such as transport, energy, and water. It provides insights into potential changes in Ireland's climate under global temperature increases of 1.5°C, 2°C, 2.5°C, 3°C, or 4°Cs. These projections generally align with previous forecasts for Ireland. The country's climate is heavily influenced by the Atlantic Meridional Overturning Circulation (AMOC), a major system of ocean currents, including the Gulf Stream, which features a northward flow of warm water and a southward flow of cold water. This system prevents Ireland from experiencing the extreme temperatures seen in other countries at similar latitudes. Recent studies suggest that the AMOC may weaken by 30–40% by 2100, leading to cooler North Atlantic Sea Surface Temperatures (SSTs). Despite this, Ireland is expected to continue warming, though the cooling effect of the AMOC might moderate the warming relative to continental Europe. Additionally, a weakened AMOC is anticipated to contribute to further sea level rise around Ireland. Climate change will cause significant shifts in temperature and rainfall patterns: average summer temperatures could rise by more than 2°C, summer rainfall could decrease by 9%, and winter rainfall could increase by 24%. Future projections also include a tenfold rise in the frequency of summer nights with temperatures exceeding 15°C by the end of the century, a decrease in the frequency of cold winter nights, and an increase in heatwaves. In Ireland, a heatwave is defined as a period of five consecutive days with daily maximum temperatures above 25°C.

11.3.5 Evolution of the environment in the absence of the project

Annex IV of the EIA Directive sets out the information required to be included in an EIAR. This includes:

“a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the Proposed Project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge”.

Under the Do-Nothing Scenario no construction works will take place and the previously identified impacts of carbon emissions from equipment, machinery and development operation will not occur. Therefore, this scenario can be considered neutral in terms of climate.

As the site is zoned for development, in the absence of the Proposed Development, it is likely that a development of a similar nature is likely to be constructed in the future in line with national policy and the development plan objectives. Therefore, the construction and operational phase impacts outlined in this assessment are likely to occur in the future, even in the absence of the Proposed Development.

11.3.6 Climatics Multi-Climate Hazard Analysis for (53.374932, -6.577307)

Under each scenario, nine categories of climate risk indices (20+ hazards) were assessed. The findings and recommendations are summarised in the following table. For the key indices, both the chronic risk (average trend) and acute risk (extremes) are provided. For example, the change in mean temperature and fire weather days are introduced in the temperature-related indices, as temperature is considered as the most relevant impact factor for climate change on asset resilience.

Table 11.7: Climatics Multi-Climate Hazard Analysis for (53.374932, -6.577307)

Category	Hazard	Summary	Exposure Level
Cloud Related	Cloud Cover	Historic average cloud cover in the area was 78.44%. This is projected to decrease to 77.89% (-0.56%) under SSP1-2.6 and 76.80% (-1.64%) under SSP5-8.5 for 2050.	4
Drought And Floods	Flood Events	The historic inundation of 100-yr flood event is 0.00 m. This is projected to 0.00 m (0%) under SSP1-2.6 and 0.00 m (0%) under SSP5-8.5 for 2050.	1
	Water Stress	The water stress index ranges from 1 to 5, with 1 indicating low stress and 5 indicating high stress. The historic water stress is rated as 2.00. And this is projected to increase to 5.00 under SSP1-2.6 and 5.00 under SSP5-8.5 for 2050.	5
Hailstorm	Hailstorm Frequency	Historical hailstorms in this location were 0.12 events/year.	n/a
Heat Stress	Heat Stress Index	The historic heat stress index in the area is 12.56. And this is projected to increase to 13.80 under SSP1-2.6 and 14.37 under SSP5-8.5 scenarios for 2050.	2
Irridiance At Surface	Surface Reaching Solar Radiation	The surface reaching solar radiation in the area was historically 119.88 W/m ² and this is projected to increase to 125.94 W/m ² under SSP1-2.6 and 124.52 W/m ² under SSP5-8.5 for 2050.	2
Lightning	Lightning Density	The historic lightning density in the area was 0.00 event/1000km ² /year.	n/a
Rainfall Related	Annual Max. 1-Day Precipitation	Historic annual maximum 1-day precipitation in the area was 34.24 mm. This is projected to increase to 36.72 mm under SSP1-2.6 and 37.32 mm under SSP5-8.5 for 2050.	4

	Annual Max. 5-Day Precipitation	Historic annual maximum 5-day precipitation in the area was 63.86 mm. This is projected to increase to 71.54 mm under SSP1-2.6 and 68.49 mm under SSP5-8.5 for 2050.	4
	Extreme Precipitation	Precipitation over 99% quantile is defined as extreme precipitation. The historic average extreme precipitation is 61.05 mm for a year and this is projected to increase to 75.28 mm (+23.31%) under SSP1-2.6 and 73.45 mm (+20.31%) under SSP5-8.5 for 2050.	4
	Heavy Precipitation Days	Precipitation over 10mm is defined as heavy precipitation. The historic average heavy precipitation days in the area was 25.10 days in a year. This is projected to increase to 26.32 days under SSP1-2.6 and 26.79 days under SSP5-8.5 for 2050.	5
	Average Annual Precipitation	Historic average precipitation in the area was 1015.68 mm/year. This is projected to increase to 1018.30 mm/year under SSP1-2.6 and 1010.87 mm/year under SSP5-8.5 for 2050.	5
Subsidence And Landslide	Landslides	The historic landslide in the area is 0.00.	n/a
	Subsidence Susceptibility Index	Subsidence susceptibility index ranges from 1-6, as very low, low, medium low, medium high, high, very high. The historic subsidence susceptibility index in the area is 3.00 and is projected to be 0.00 for 2040.	n/a
Temperature Related	Cold Days	The historic cold days in the area were 7.83% per year. This is predicted to decrease to 3.11% under SSP1-2.6 and 1.61% under SSP5-8.5 for 2050.	2
	Days >35°C	The historic days above 35°C in the area were 0.00 days per year. This is predicted to decrease to 0.00 days under SSP1-2.6 and 0.00 days under SSP5-8.5 for 2050.	1
	Days >40°C	The historic days above 40°C in the area were 0.00 days per year. This is predicted to 0.00 days under SSP1-2.6 and 0.00 days under SSP5-8.5 for 2050.	1
	Fire Weather Days	The historic fire weather days in the area were 22.01 days per year. This is predicted to increase to 31.83 (+44.61%) days under SSP1-2.6 and 38.97 (+77.02%) days under SSP5-8.5 for 2050.	3
	Mean Temperature	The historic mean annual temperature in the area is 9.52°C. This is projected to increase to 10.48°C (+0.95°C) under SSP1-2.6 (optimistic) and 11.02°C (+1.50°C) under SSP5-8.5 (business as usual or pessimistic scenario) for 2050.	3
	Warm Days	Warm day are defined as when the maximum temperature is beyond 90% percentile. The historic warm days in the area are 13.50% per year and this it projected to increase to 26.77% under SSP1-2.6 and 32.47% under SSP5-8.5 scenarios for 2050.	3
Wind Related	Storm Wind Speed	The historic storm wind speed of the area is 15.95 m/s and this is predicted to be increase to 16.40 m/s (+2.79%) for SSP5-8.5 scenario for 2050.	4
	Wind Speed	Historic average wind speed in the area was 5.09 m/s. This is projected to be 4.84 m/s under SSP1-2.6 and 4.97 m/s under SSP5-8.5 for 2050.	5

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

- **Size of Proposed Development:** A ten-year planning permission is being sought for a Proposed Development comprising of 581 no. residential units, a neighbourhood centre and all associated development, on a site of approximately 15.27 hectares. The residential component of the development consists of 185 no. apartment / duplex units and 396 no. houses to be provided. The proposed neighbourhood centre is arranged in a 5 storey block and a part 6 storey block with a new public plaza and includes a range of community and commercial uses, comprising a childcare facility (762 sq.m), café unit (74 sq.m), health centre (174 sq.m), pharmacy/shop (124 sq.m) and a convenience shop (166 sq.m). A total of 89 no. apartments units are proposed at upper levels of the neighbourhood centre. A total of 888 no. car parking spaces are proposed, which includes 711 no. in-curtilage spaces for houses, 115 no. spaces for the duplex apartments / apartments, 14 no. for the commercial uses at the neighbourhood centre, 12 no. spaces for the staff of the childcare facility and 36 no. visitor spaces for residents. A total of 623 no. cycle spaces are proposed for residents, 42 no. spaces for the neighbourhood centre uses and 93 no. visitor cycle parking spaces. The proposal includes hard and soft landscaping, lighting, boundary treatments, communal open space, 2.76 ha of public open space including a Local Park and Pocket Parks, children's play areas and an ancillary play area for the childcare facility. The development will be accessed from the permitted Maynooth Eastern Ring Road (MERR).
- **Cumulation with other Proposed Development:** The subject site is identified as part of the 'Key Development Area – Railpark' within the Maynooth LAP 2025-2031. In each of the chapters, the impact of the proposed and future planned development will be considered as well as other known 'committed developments' within the surrounding area. A list of the other developments to be considered is provided in Appendix 2.1 in Chapter 2.
- **Use of Natural Resources Construction Impacts:** Energy, including electricity and fuels, will be required during the construction phase. Construction process will include use of various raw materials. No out of the ordinary use of natural resources is likely during the construction process. No significant negative impacts are likely. **Operation Impacts** Water, consumption of electricity and energy related to the residential occupancy of the completed development. No out of the ordinary use of natural resources is likely during the operation phase. No significant negative impacts are likely.
- **Production of Waste:** The construction process will result in some construction related waste, which will be disposed of in compliance with the CEMP. No significant negative impacts are likely. **Operational waste** generated will be domestic waste from the residential units. All domestic waste will be disposed of by a licensed waste contractor. No significant negative impacts are likely. **Pollution and Nuisances** The construction process has the potential to cause nuisance related to noise, dust and vibration impacts. The CEMP will detail measures to mitigate likely impacts. The Proposed Development will be subject to normal conditions related to construction working hours to protect the residential amenity of the area. With mitigation measures in place no significant negative impacts are likely as a result of the construction phase of the project. An Operational Waste Management Plan will put in place measures to avoid and / or mitigate pollution from operational waste. Suitable parking is provided on site to prevent traffic congestion. With mitigation measures in place no significant negative impacts during operation of the Proposed Development are likely.
- **Risk of Major Accidents:** Construction Impacts- None foreseen, subject to strict compliance with building regulations and environmental controls. No significant negative impacts are likely.

Operation Impacts None foreseen, subject to compliance with building and fire regulations with mitigation measures in place no significant negative impacts are likely.

- Risk to Human Health: The CEMP will detail measures to mitigate any likely impacts associated with noise, dust, or pollution from the construction process. With mitigation measures in place no significant negative impacts are likely. The Proposed Development will be connected to public water and sewer infrastructure. No emissions other than from air conditioning and heating units are anticipated. No significant negative impacts are likely.

11.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

During both the construction and operational phases of the development, there is potential for various greenhouse gas emissions to be released into the atmosphere. According to TII guidance, the significance of these GHG emissions on the climate is evaluated based on the total emissions across all stages of the Proposed Development.

11.5.1 Construction Phase GHG Assessment

The TII Carbon toolkit was utilised to quantify the construction phase embedded carbon for the Proposed Development. This toolkit can quantify carbon in infrastructure projects using Ireland-specific emission factors and data. Detailed project information including tonnage of materials was obtained from the Engineering Design Team.

The project design team have also utilised the Irish Green Building Councils (IGBC) Carbon Designer tool for Ireland. This provides a high-level initial assessment of the lifecycle carbon for the development based on basic information and default values with the option to edit these defaults as required to reduce impacts.

Greenhouse gas emissions have been quantified at all aspects of the construction phase including the following stages:

- Production stage: Embodied carbon is the carbon contained within a material or product. It is the sum of all carbon emissions that have been generated during the extraction, processing, and manufacturing of a particular product.
- Transportation to site: emissions associated with the carbon miles of the project materials. The impact of transporting materials from factory/source to site to facilitate construction is reported separately. A series of assumptions are made about the variables that impact transport emissions (material density, vehicle type, vehicle capacity and distance travelled) and assuming that the material may be transported from sources locally within 50km, regionally within 100km and nationally within 250km;
- Site Operations/Construction activities:
 - Site clearance emissions associated with plant and machinery required to clear the site. The carbon tool has a range of assigned land use categories for estimating site clearance. Different land use types have higher or lower carbon intensity for site clearance, which is linked to the energy required to clear the site.
 - Emissions arising from excavation activities based on the energy used in excavation activities. Energy expenditure varies depending on the type of ground to be excavated, e.g., rock excavation is much more energy intensive than topsoil excavation;

- Construction activities covers carbon emissions generated during the construction of the proposed Project based on the scale and duration of the project, and
- The generation of waste during the construction phase has potential for climate impact and the nature and scale of this impact depends on the type and volume of waste generated coupled with the nature of the waste treatment (reuse, recycling, recovery or disposal).
- Material replacement & refurbishment: Ongoing material refurbishment and replacement throughout the lifetime of the development is included within this stage of the GHG assessment these are default values based on the typical maintenance requirements for the chosen material types over the assumed 50-year lifetime

The results of the assessment of the above stages using the TII and IGBC tools are presented in Table 11.8 and Figures 11.4 & 11.5. The results indicate that the total GHG emissions generated as a result of the construction of the proposed Project are 36,860,557.00 Kg of CO₂eq (36,860.56 tonnes CO₂eq).

The carbon assessment has identified hotspots for embodied carbon emissions, particularly those associated with building materials. These emissions have been calculated using standard default materials for different building types within the OneClick tool, as detailed material information was not available at this stage of the project. Additionally, the average material types from the TII Carbon Tool were utilised for this assessment due to the lack of more specific information.

As anticipated construction materials represent the largest portion of carbon emissions for the Proposed Development, constituting about 74% of the total embodied carbon emissions during the construction phase across the different buildings. The highest carbon impact is observed in the external walls, beams, floors, and roofs, based on the standard default values and assumptions used in the carbon calculations. The rest of the construction phase's embodied carbon emissions come from transportation to the site, site operations, and material replacement.

The total embodied carbon for the construction phase, including the maintenance and replacement of materials throughout the development's lifetime, has been calculated at 36,860.56 tonnes CO₂e (see Table 11.8). Since the overall GHG emissions from the development cannot be directly compared to a single sector's 2030 carbon budget, the emissions are categorised into different assessment areas.

These categories must be individually compared to the relevant sectoral emissions budgets, as outlined in Table 11.4. For the Proposed Development, the applicable sectoral emissions budgets include those for Industry Buildings (Residential), Transport, and Waste. The projected emissions for the development are annualised over an assumed 50-year lifespan and then compared to the relevant sector's 2030 carbon budgets. This annualization process facilitates a proper comparison with annual GHG targets.

Table 11.8: Construction Phase Greenhouse Gas Emissions

Stage	GHG Assessment Category	Predicted GHG Emissions (tCO ₂ e)	Relevant Sector for Carbon Budget Comparison	Annualised GHG Emissions as % of Relevant Carbon Budget
Production Stage	Materials	27,066.57	Industry	0.01353%

Transportation to site	Material Transport	84.60	Transport	0.00003%
Site Operations/Construction activities	Clearance and demolition	77.23	Industry	0.00004%
Site Operations/Construction activities	Excavation	48.30	Industry	0.00002%
Site Operations/Construction activities	Construction Worker Travel to Site	1,889.40	Transport	0.00063%
Site Operations/Construction activities	Construction Waste Disposal	3,014.85	Waste	0.00603%
Site Operations/Construction activities	Construction Waste Transport	18.03	Transport	0.00001%
Site Operations/Construction activities	Construction Fuel Usage	38.60	Transport	0.00001%
Material replacement & refurbishment	Maintenance Material	4,622.98	Industry	0.00231%
Total		36,861 tCO₂e		

Note 1 Project lifespan assumed 50 years for calculation purposes in line with best practice

Figure 11.4: Predicted Construction Categories Greenhouse Gas Emissions tCO₂e

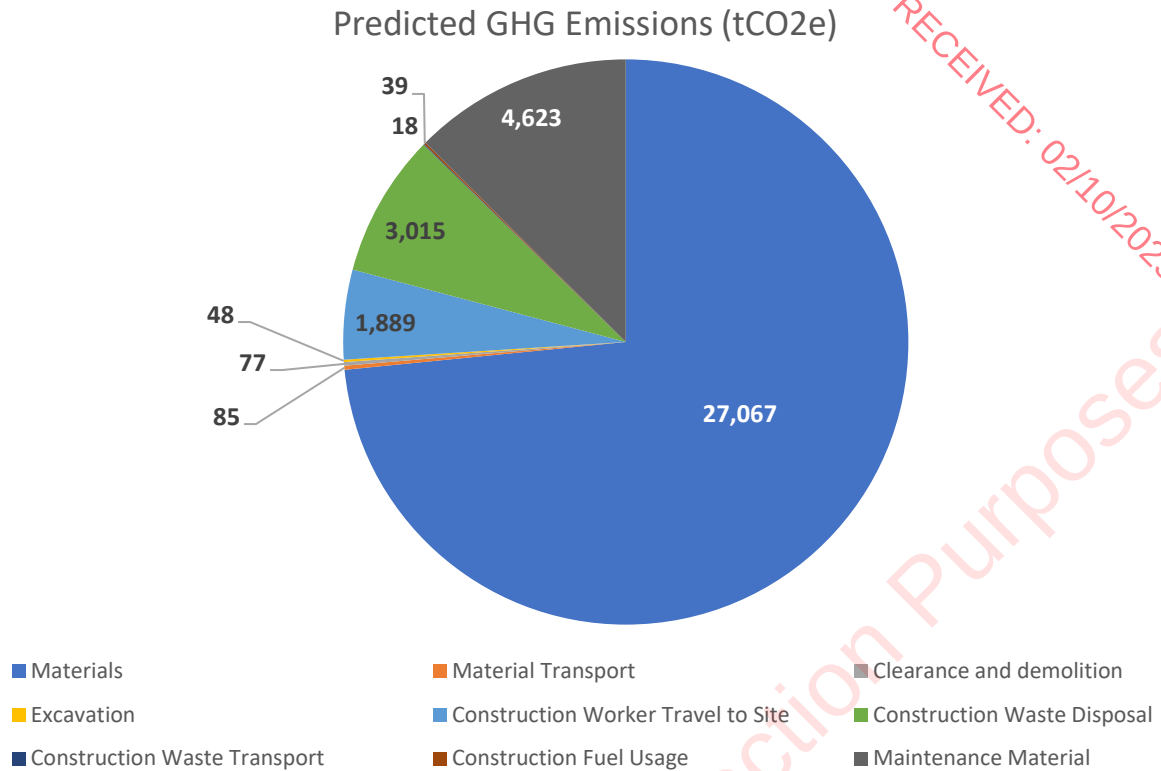
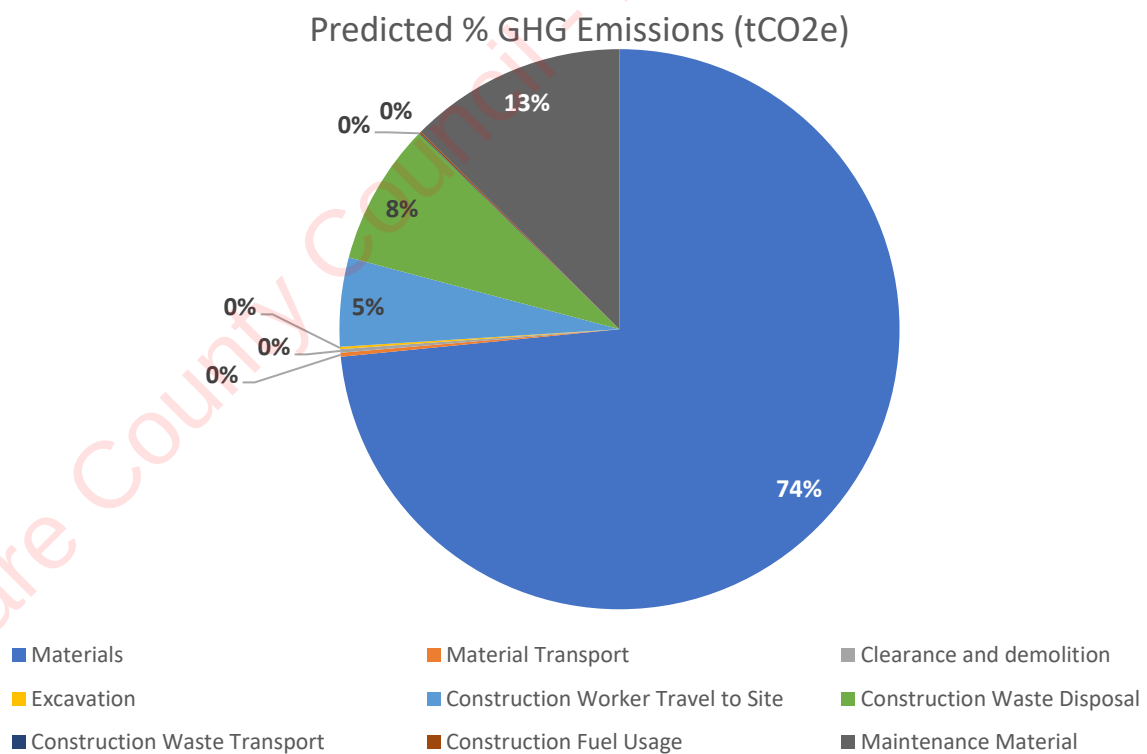


Figure 11.5: Predicted % Construction Categories Greenhouse Gas Emissions tCO₂e



The projected GHG emissions (outlined in Table 11.8) can be averaged across the entire lifespan of the Proposed Development to provide annual emissions estimates, facilitating direct comparison with national annual emissions and targets.

Table 11.9 compares these GHG emissions with the 2030 carbon budgets for the transport, industry, and waste sectors, Ireland's total GHG emissions for 2022, and Ireland's EU 2030 target of a 30% reduction in non-ETS sector emissions from 2005 levels (33 Mt CO₂e) as specified in Regulation EU 2018/842.

When annualised over the Proposed Development's 50-year lifespan, the estimated total GHG emissions amount to 0.0013% of Ireland's total GHG emissions in 2023 and 0.0022% of Ireland's non-ETS 2030 emissions target. Specifically, emissions from transport-related activities account for 0.0123% of the 2030 Transport budget, construction waste emissions represent 0.0737% of the Waste budget, and industry-related emissions comprise 0.0184% of the 2030 Industry budget.

Table 11.9: Estimated Construction GHG Emissions relative to Sectoral Budgets and GHG Baseline

Target/Sectoral Budget (tCO ₂ e)		Sector Annualised Proposed Development GHG Emissions are Compared	Annualised Proposed Development GHG Emissions as % of Relevant Target/Budget
Ireland's 2023 Total GHG Emissions (existing baseline)	58,829,000	Total GHG Emissions	0.0013%
Non-ETS 2030 Target	33,381,312	Total GHG Emissions	0.0022%
(Industry Sector) 2030 Sectoral Budget	4,000,000	Total Industry Emissions	0.0184%
(Transport Sector) 2030 Sectoral Budget	6,000,000	Total Transport Emissions	0.0123%
(Waste Sector) 2030 Sectoral Budget	1,000,000	Total Waste Emissions	0.0737%

11.5.1.1 Impact of Climate Change on the Proposed Construction Phase

According to the 'LA 114 (2019) – Climate' guidance, which has been successfully implemented in the UK and referenced by the EPA here in Ireland, a qualitative assessment of disruption risk should be reported for the construction phase. The guidance suggests that changes to long-term seasonal averages due to climate change are not anticipated to be significant by the construction year, as predictions are typically cantered around mid-century. However, flooding during construction remains a possibility, and the areas at risk of flooding are detailed in Chapter 9 on Water (Including Hydrology & Flood Risk). Flood risk measures and extreme weather considerations have been integrated into the construction planning process.

The site-specific flood risk assessment indicates that no area of the subject site is liable to flood from fluvial, coastal or groundwater sources. All sources indicate that there is a low risk of flooding on site and that the site is within Flood Zone C, ensuring it is appropriate for residential and commercial developments.

Mitigation measures are outlined in Chapter Water (Including Hydrology & Flood Risk) to manage flood risk impacts during the construction stage, affecting the rail line, construction zones, and nearby properties. With these measures implemented, the risk of climate change impacts, particularly flooding, during the construction phase of the proposed project is not deemed significant.

11.5.2 Operational Phase

11.5.2.1 Operational Impacts

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for flooding related impacts on site in future years. However, adequate attenuation and drainage have been provided for to account for increased rainfall in future years as part of the design of this development. Therefore, the impact will be long-term, localised, neutral and imperceptible.

There is the potential for a number of greenhouse gas emissions to the atmosphere during the operational phase of the development. The main sources of GHG emissions from the operational stage of the development arise from heating, domestic hot water, and lighting. The proposed project will introduce sustainable and renewable energy technology to the development. Ongoing maintenance of the Proposed Development materials has been accounted for within Section 11.5.1 above. The following section outlines the impact of operational energy use on GHG emissions.

There is the potential for increased traffic volumes to effect climate, therefore, traffic related CO₂ emissions have also been calculated through the use of the TII REM tool. The output is provided in terms of CO₂eq for the Opening Year (2028) and Design Year (2043). 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. The predicted concentrations of CO₂ for the Opening Year (2028) and Design Year (2043) are detailed in Chapter 10 Air Quality and below in table 11.10.

Table 11.10: Predicted concentrations of traffic related CO₂ emissions

Year	Scenario	CO ₂ eq (tonnes/annum)
2028	Do Nothing	3,169.55
	Do Something	3,897.07
2043	Do Nothing	3,210.72
	Do Something	3,993.96
Increment in 2028		727.52
Increment in 2043		783.24

The Proposed Development has been designed to reduce the impact to climate where possible. A number of measures have been incorporated into the design to ensure the operational phase emissions

are minimised. These are outlined fully within the Energy Statement prepared by Fallon Design (2025) and are summarised below.

The development will be a Nearly Zero Energy Building (NZEB) in accordance with the Part L2021 requirements. Each building will have a Building Energy Rating (BER) that will comply with the Part L requirements. The following measures, or similar will be incorporated into the Proposed Development to achieve a more energy efficient (i.e. less carbon intensive) design. All measures will be reviewed at the detailed design stage and the most appropriate options will be implemented.

Dwellings

To achieve Part L Compliance for the development Fallon Design (2025) proposes:

- Exceed minimum U-Value standards where possible.
- Achieve air tightness standards of 3 m³/m²/hr.
- Thermally model all thermal bridging details to achieve thermal bridging factors of less than 0.15 W/m²K
- Install high efficiency gas fired boilers and time and temperature zone control in all dwellings
- Install centralized mechanical ventilation systems to ensure adequate ventilation rates are achieved in the dwelling which maximize the benefits of the airtight construction.
- Provide roof high efficiency heat pump technology to meet the renewal requirements and low running costs.

Building Other Than Dwellings

The proposed approach to achieving Part L Compliance for the non-residential building will be as follows:

- Exceed minimum U-Value standards where possible.
- Achieve air tightness standards of 5 m³/m²/hr
- Adopt Acceptable Construction Details to limit thermal bridging.
- Analyse the proposed glazing proportions and orientations and select appropriate solar control glazing and/or shading devices to reduce the solar gain to the spaces to an appropriate level.
- Provide roof mounted PV panels to provide the required renewable energy contribution.

It is proposed to incorporate bicycle and electric vehicle parking spaces within the Proposed Development to promote the use of sustainable transport. Overall, these measures will aid in reducing the impact to climate during the operational phase of the Proposed Development. Full descriptions of the measures proposed, and their benefits are outlined within the Building Lifecycle Report submitted with this application.

In Table 11.11, operational GHG emissions have been compared against the carbon budget for the residential sector in 2030, against Ireland's total GHG emissions in 2023 and against Ireland's EU 2030 target of a 30% reduction in non-ETS sector emissions based on 2005 levels (33 Mt CO₂e) (set out in Regulation EU 2018/842 of the European Parliament and of the Council).

The estimated total GHG emissions, when annualised over the 50-year Proposed Development lifespan, are equivalent to 0.00129% of Ireland's total GHG emissions in 2023 and 0.00228% of Ireland's non-ETS 2030 emissions target. The total GHG emissions associated with residential-related activities are 0.01323% of the 2030 residential budget.

Table 11.11: Estimated Operational GHG Emissions relative to Residential Budget and GHG Baseline

Target/Sectoral Budget (tCO ₂ e)		Sector Annualised Proposed Development GHG Emissions are Compared	Annualised Proposed Development GHG Emissions as % of Relevant Target/Budget
Ireland's 2023 Total GHG Emissions (existing baseline)	58,829,000	Total GHG Emissions	0.00263%
Non-ETS 2030 Target	33,000,000	Total GHG Emissions	0.00463%
(Residential Sector) 2030 Sectoral Budget	5,753,000	Total Industry Emissions	0.02685%
(Transport Sector) 2030 Sectoral Budget	6,000,000	Total Transport emissions	0.013054%

11.5.2.2 GHGA Significance of Effects

The TII guidance (2022) states that the following two factors should be considered when determining significance:

- The extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050; and
- The level of mitigation taking place.

The level of mitigation described in Section 11.8 has been taken into account when determining the significance of the Proposed Development's construction and operational GHG emissions. According to the TII significance criteria described in Section 11.6.3.4, the significance of the GHG emissions during the construction and operational phase is minor adverse.

In accordance with the EPA guidelines (EPA, 2022), the above significance equates to a significance of effect of GHG emissions during the construction and operational phase which is **direct, long-term, negative and slight, which is overall not significant**.

11.5.3 Climate Change Risk Assessment

11.5.3.1 Construction Phase

A detailed CCRA of the construction phase has been scoped out, as discussed in Section 11.3.3, which state that there are no residual medium or high-risk vulnerabilities to climate change hazards and

therefore a detailed CCRA is not required. However, consideration has been given to the Proposed Development's vulnerability to the following climate change hazards with best practice mitigation measures proposed in Section 11.8:

- Flood risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding;
- Increased temperatures potentially causing drought, wildfires and prolonged periods of hot weather;
- Reduced temperatures resulting in ice or snow;
- Geotechnical impacts; and
- Major Storm Damage – including wind damage.

11.5.3.2 Operational Phase

To assess the vulnerability of the Proposed Development to climate change, it is essential to first evaluate the development's sensitivity and exposure to various climate hazards. The following climate hazards have been analysed in relation to the Proposed Development: flooding (coastal, pluvial, and fluvial), extreme heat, extreme cold, wildfire, drought, extreme wind, lightning, hail, landslides, and fog.

The sensitivity of the Proposed Development to these climate hazards is evaluated independently of its location. Table 11.12 provides a sensitivity assessment of the Proposed Development, rated on a scale from high (3) to medium (2) to low (1). After establishing sensitivity, the exposure of the Proposed Development to each climate hazard is determined, reflecting the likelihood of these hazards occurring at the project site, also rated on a scale of high (3), medium (2), and low (1). The overall vulnerability of the Proposed Development to each climate hazard is then calculated by multiplying sensitivity and exposure, as outlined in Table 11.11.

Table 11.12: Climate Change Vulnerability Assessment

Climate Hazard	Sensitivity	Exposure	Vulnerability
Flooding (Coastal, Pluvial, Fluvial)	1 (Low)	1 (Low)	1 (Low)
Extreme Heat	1 (Low)	1 (Low)	1 (Low)
Extreme Cold	1 (Low)	1 (Low)	1 (Low)
Wildfire	1 (Low)	1 (Low)	1 (Low)
Drought	1 (Low)	1 (Low)	1 (Low)
Extreme Wind	1 (Low)	1 (Low)	1 (Low)
Lightning & Hail	1 (Low)	1 (Low)	1 (Low)
Landslides	1 (Low)	1 (Low)	1 (Low)
Fog	1 (Low)	1 (Low)	1 (Low)

The sensitivity and exposure of the area were assessed using various online tools such as Met Éireann's TRANSLATE tools, Climate Ireland – Climate Change Projection Maps, and the project teams subject matter expertise. The analysis concluded that the Proposed Development has no significant vulnerabilities to the identified climate hazards, as outlined below. All identified vulnerabilities are classified as low. As a result, there are no residual medium or high-risk vulnerabilities related to climate change hazards, making a detailed Climate Change Risk Assessment (CCRA) unnecessary.

The Site-Specific Flood Risk Assessment (SSFRA) conducted by Roughan & O'Donovan (2025) indicates that the site is located within Flood Zone C. The consulted sources indicate that no area of the subject site is liable to flood from fluvial, coastal or groundwater sources. All sources indicate that there is a low risk of flooding on site and that the site is within Flood Zone C, ensuring it is appropriate for residential and commercial developments.

Due to the predicted increase in the frequency and intensity of extreme rainfall events, it is prudent that site specific drainage and management measures aimed at mitigating the effects of pluvial flooding are incorporated into the development design. The Proposed Development includes the construction of a surface water network which consists of Sustainable Urban Drainage Systems (SuDS) measures which will minimise the impact to the receiving environment and manage the pluvial flood risk at the site. The proposed surface water network has been designed with an allowance for climate change as per the KCC CDP 2023-2029 and in accordance with the Kildare County Development Sustainable Drainage System (SuDS).

The correct operation and maintenance of the drainage system is necessary to reduce the risk of human or mechanical error causing pluvial flood risk from blockage. The CFRAM mapping available for the site indicates that the pluvial flood risk to the development is low

Groundwater flooding occurs when the water table rises above the land surface, this means the natural underground drainage system is incapable of sufficiently draining itself, resulting in the emergence of groundwater at the surface. It generally requires sustained rainfall over relatively longer duration than other forms of flooding, its location is discontinuous, and they can last for weeks or months. The SSFRA has determined that the Proposed Development is not at risk of groundwater flooding.

Regarding wildfires, the Think Hazard! tool developed by the Global Facility for Disaster Reduction and Recovery classifies the wildfire hazard in the area as low. This classification suggests there is a 4% to 10% chance of weather conditions that could support a problematic wildfire in the project area, potentially causing disruptions and posing a low but real risk to life and property each year. Although future climate models predict an increase in conditions favourable to wildfires—such as higher temperatures and extended dry periods—the project's suburban location significantly reduces the wildfire risk. Therefore, the Proposed Development is considered to have a low vulnerability to wildfires.

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

Extreme temperatures, whether extreme heat or cold, have the potential to affect building materials and associated infrastructure. During the detailed design stage, high-quality, durable, and resilient materials will be selected to withstand future temperature fluctuations due to climate change. Consequently, the Proposed Development is assessed to have at most, low vulnerabilities to these climate hazards, and a detailed risk assessment is not necessary.

There is no additional vulnerability with respect to all climate hazards when design mitigation has been put in place in order to alleviate this known vulnerability to future climate change risk.

11.5.3.3 CCRA Significance of Effects

With the implementation of design mitigation measures, the Proposed Development faces no substantial risks from climate change. As outlined in the EPA Guidelines (EPA, 2022), the impacts of climate change on the development are considered **direct, long-term, negative, and imperceptible**, and are therefore **not deemed significant** in terms of Environmental Impact Assessment (EIA).

11.6 POTENTIAL CUMULATIVE IMPACTS

Regarding the requirement for a cumulative assessment, TII PE-ENV-01104 (2022) indicates that "since the GHG assessment pertains to global climate and the impacts on the receptor from a project are not geographically constrained, the typical approach for cumulative assessment in EIA is not deemed applicable." However, by evaluating the GHG impact of a project in relation to its alignment with Ireland's trajectory towards net zero and sectoral carbon budgets, this assessment will demonstrate the project's potential influence on Ireland's ability to meet its national carbon reduction targets. Consequently, the assessment approach is inherently cumulative.

The following potential cumulative impacts related to climate have been considered within this Environmental Impact Assessment Chapter. Cumulative impacts result from the combined effects of the Proposed Development alongside other existing or planned developments in the area. These impacts can intensify climate-related risks and environmental pressures, leading to more pronounced and widespread consequences. IEMA emphasises the importance of understanding these interactions to develop effective mitigation and adaptation strategies that align with broader sustainability objectives.

Greenhouse Gas (GHG) Emissions

As per IEMA's guidance on assessing climate change within EIAs (2022), the cumulative effect of GHG emissions from the Proposed Development, in conjunction with other developments, must be carefully evaluated. The aggregation of emissions across multiple projects can significantly contribute to global climate change, exacerbating the effects of rising temperatures, more frequent extreme weather events, and changes in precipitation patterns. To address this, we have identified robust mitigation measures aimed at reducing the development's carbon footprint, ensuring alignment with regional and national climate targets, and adhering to the principles of the EU Taxonomy and Near Zero Energy Building (NZEB) standards. Nearby emission sources to the Proposed Development include Residential sites, retail premises, education facilities and road emissions.

Water Resources and Flooding

IEMA (2022) stresses the importance of considering cumulative impacts on water resources, particularly with respect to flood risks and water availability. The combined effect of increased rainfall due to climate change and additional impermeable surfaces from multiple developments can overwhelm existing drainage infrastructure, leading to a higher frequency and severity of flooding events. This underscores the need for integrated water management strategies that enhance the resilience of water systems and incorporate climate adaptation measures, such as sustainable urban drainage systems (SUDS), as recommended within the site-specific flood risk assessment.

Biodiversity and Habitat Loss

Cumulative impacts on biodiversity are another significant concern. IEMA guidance (2022) highlights that climate change, coupled with habitat loss from multiple developments, can lead to more severe impacts on ecosystems and species. The fragmentation of habitats and disruption of ecological networks can accelerate species decline and reduce ecosystem resilience. To mitigate these impacts, the EIA should incorporate strategies for habitat conservation, restoration, and connectivity, ensuring that biodiversity is protected and enhanced in the face of cumulative pressures.

Air Quality and Human Health

IEMA also advises considering the cumulative impacts on air quality and human health. Increased emissions from multiple developments can lead to higher concentrations of pollutants, exacerbating climate change-related health risks, such as respiratory conditions and heat-related illnesses. The EIA should ensure that air quality management plans are in place and that mitigation measures are designed to minimise emissions, particularly in urban areas where cumulative impacts are more likely to be significant.

Soil Degradation and Erosion

Cumulative impacts on soil degradation and erosion are another area of concern highlighted by IEMA. The combined effects of climate change-induced extreme weather events and land disturbance from construction activities can lead to accelerated soil erosion, reduced fertility, and increased sedimentation in water bodies. Sustainable land management practices, including erosion control measures and soil conservation techniques, should be integrated into the development to mitigate these cumulative impacts.

Infrastructure and Energy Demand

Finally, IEMA's guidance emphasises the importance of considering the cumulative impacts on infrastructure and energy demand. As multiple developments increase the demand for energy, there is a risk of overloading local grids and increasing reliance on fossil fuels, which could exacerbate GHG emissions and climate change. The Proposed Development does promote energy efficiency, the use of renewable energy sources, and the integration of smart grid technologies to ensure that infrastructure can accommodate future energy needs without compromising climate goals.

11.6.1 Mitigation and Monitoring

In accordance with IEMA guidance (2022), addressing cumulative impacts requires a comprehensive approach that includes effective mitigation strategies and ongoing monitoring. These strategies should focus on enhancing energy efficiency, reducing GHG emissions, protecting natural habitats, managing water resources sustainably, and ensuring resilient infrastructure. Continuous monitoring and adaptive management will be essential to identify cumulative impacts early and to adjust mitigation measures as necessary to minimise long-term environmental and climate-related risks.

By considering cumulative impacts within the climate chapter of the EIA, we ensure a thorough and responsible assessment that aligns with IEMA's best practices, contributing to the sustainability and resilience of both the Proposed Development and the broader environment.

11.7 'DO NOTHING' IMPACT

Under the Do-Nothing Scenario no construction works will take place and the previously identified impacts of carbon emissions from equipment, machinery and development operation will not occur. Therefore, this scenario can be considered neutral in terms of climate.

11.8 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

11.8.1 Construction Phase

Embodied carbon of materials and construction activities is the primary source of climate impacts during the construction phase. Pre-construction carbon Avoidance, Remedial & Mitigation Measures include:

Design for Performance

- Request a Design for Performance approach from design teams and contractors.
- Include contractual targets for whole life carbon with a focus on Net Zero and nature-positive goals where possible.

Circularity in Design

- Require design teams to develop a circularity concept for projects, focusing on adaptability, disassembly, and reuse.
- Set a target for a percentage of reused and recycled materials in designs.

Building Lifecycle Report

- Ensure the building lifecycle report is regularly reviewed and updated in line with current policy and best practice for sustainable construction.

Carbon Literacy

- Develop carbon literacy within design and construction teams by providing training on carbon literacy, ESG reporting, and disclosure.
- Incorporate sustainability and carbon considerations into site team talks, construction targets, and reporting.
- Include training clauses for contractors and sub-contractors to upskill their teams in low-energy construction techniques.

Building Renovation Passports (BRPs)

- Request Building Renovation Passports for this asset as part of the roadmap to decarbonise each asset.

Cement Reduction

- Specify the minimum amount of cement needed in concrete and substitute where feasible to reduce cement usage.

Sustainable Procurement

- Review sustainable procurement and material choices during detailed design to identify and implement lower embodied carbon options.

- Request Environmental Product Declarations (EPDs) and prefer products with EPDs where possible within procurement restrictions.
- Drive demand for EPDs by increasing the percentage of products used in the project with EPDs.

European Framework for Sustainable Buildings

- Commit to using key indicators from the European Framework for sustainable buildings, Level(s), with support from the IGBC.
- Focus on indicators such as Life Cycle Assessment (LCA), Life Cycle Cost (LCC), Indoor Air Quality (IAQ), and Circularity.

Energy and Carbon Performance Reporting

- Plan to disclose the operational energy and carbon performance of the project in your annual reporting.

Post-Occupancy Evaluation

- Allow for post-occupancy evaluation of completed developments to ensure feedback is passed to the design team.

Construction Waste Management

- Create a construction programme allowing sufficient time to determine reuse and recycling opportunities for all waste streams.
- Appoint a competent waste contractor to undertake a pre-construction audit detailing resource recovery best practice and identifying materials for reuse and recycling.
- Reuse materials on site possible.
- Implement effective segregation and storage practices for recyclable materials.
- Provide training for site personnel on waste management practices.
- Focus on minimizing waste generation and maximizing recycling, reuse, and recovery of waste.

EU Taxonomy Compliance

- Commit to complying with EU taxonomy requirements on the circular economy, specifically reuse, recycling, and material recovery of construction waste.
- Review and ensure compliance with the EU Taxonomy Regulation (EU) 2020/852 regarding circular economy practices for construction waste.

Local Material Sourcing

- Source materials locally where possible to reduce transport-related CO2 emissions.

Building Certifications

- Aim for building certifications such as HPI (Home Performance Index), LEED (Leadership in Energy and Environmental Design), or equivalent, to ensure sustainable and high-performance standards are met throughout the project.

The Applicant is committed to operating in an environmentally responsible manner to reduce their impact on climate change, conserve natural resources and operate in compliance with environmental regulations. They acknowledge the risk of climate change and commit to understanding how their activities and developments contribute to its causes. The Applicant commit to determining what actions they can take to reduce the embodied carbon of construction and the operational energy use of their

completed developments. The Applicant believe that risk management is critical to development success and acknowledge that the mitigation of climate risks is beneficial to the global environment, society, and our development assets. Accordingly, they study and incorporate these risk parameters within their development criteria. The Applicant actively seek and develop projects that are consistent with the transition toward a global low carbon economy, the cultivation of resilient developments, communities and enterprises, and their high standards of development with healthy indoor environments, water conservation measures and energy efficient housing with low embodied carbon construction materials.

The Applicant have committed to the following environmental sustainability objectives as part of their ESG Policy:

- Build very energy efficient houses
- Built the largest award winning certified Passive House development in Ireland
- R&D programme to achieve continuous improvement in our designs and building methods to reduce CO2 emissions
- All housing is wired ready for EV chargers, solar PV
- We transitioned our electricity supply to 100% renewable electricity for head office and all construction sites
- Replaced 750 000km of diesel car use with full EV Vehicles. The target for full fleet transition by 2025
- Design low carbon developments in all aspects of design, construction and waste management
- Water conserving low flow plumbing fittings are installed as standard
- Waste segregation on site
- Waste reduction management plan
- Developments use excavated soil on site in recreational areas

Regarding the development's resilience to climate change, the Contractor will be required to mitigate the effects of extreme weather, such as heavy rainfall, flooding, windstorms, and temperature fluctuations, through site risk assessments and method statements. Additionally, certified datasheets for construction materials will outline their operational temperature limits, ensuring that temperature-sensitive materials perform adequately. The Contractor will also address risks associated with fog, lightning, and hail through appropriate risk assessments and mitigation plans.

During the construction phase the following best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts to climate:

CLIMATE CONST 1: Energy-Efficient Equipment

- Use energy-efficient machinery and equipment on-site. Regular maintenance and proper operation can also help reduce fuel consumption and emissions.

CLIMATE CONST 2: Renewable Energy

- Incorporate renewable energy sources, such as solar panels, to power construction activities. This can significantly reduce reliance on fossil fuels

CLIMATE CONST 3: Reduce Idling

- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.

CLIMATE CONST 4: Sustainability Awareness

- Ensure that sustainability and carbon specifically is incorporated into site team talks, construction and reporting targets. Integrate training clauses for contractors and sub-contractors to upskill their onsite personnel including sub-contractors in low energy construction skills. Appoint sustainability champions to ensure that the project continues to perform in a sustainable manner.

CLIMATE CONST 5: Sustainable Transportation

- Encourage carpooling, use of public transportation, or electric vehicles for workers commuting to the site.

CLIMATE CONST 6: Monitoring and Reporting

- Regularly monitor and report GHG emissions from the construction site. This helps in identifying areas for improvement and ensuring compliance with environmental standards Sustainability spot checks should be added to ongoing site inspections and feedback shared with all onsite to ensure measures are being adopted.

CLIMATE CONST 7: Maintenance

- Ensure all plant and machinery are well maintained and inspected regularly.

CLIMATE CONST 8: Waste Management

- Implement a robust waste management plan to reduce, reuse, and recycle construction waste. Proper waste management can significantly cut down on emissions Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site. Application of the waste hierarchy to all waste material generated.

CLIMATE CONST 9: Sustainable Procurement:

- Sourcing materials locally where possible to reduce transport related CO2 emissions.

11.8.2 Operational Phase

A number of measures have been incorporated into the design of the development in order to mitigate against the impacts of future climate change. For example, adequate attenuation and drainage have been incorporated into the design of the development to avoid potential flooding impacts as a result of increased rainfall events in future years. These measures have been considered when assessing the vulnerability of the Proposed Development to climate change (see Section 11.4.5).

The Proposed Development has been designed to reduce the impact on climate as a result of energy usage during operation. The Climate Action/Energy Statement and building lifecycle report and submitted under separate cover with this planning application details a number of incorporated design mitigation measures that have been incorporated into the design of the development to reduce the impact on climate wherever possible.

Such measures included in the Proposed Development to reduce the impact to climate from energy usage are:

- The development will be in compliance with the requirements of the Near Zero Energy Building (NZEB) Standards.

- EU Taxonomy alignment with 10% lower than NZEB.
- A renewable energy rating (RER) of 20% will be achieved to comply with Part L (2021) of the NZEB regulations.
- A Building Energy Rating (BER) of A2/A3 is being targeted. This will equate to the following emissions. A2 – 25-50 kwh/m2/yr with CO2 emissions circa 10kgCO2/m2 year A3 – 51-75 kwh/m2/yr with CO2 emissions circa 12kgCO2/m2 /year (JFA; 2025)
- Improved building thermal transmittance (U-Values), air permeability and thermal bridging.
- An exhaust air heat pump system is under consideration for heating, hot water and ventilation of the apartment units.
- PV Solar Panels are proposed in order to meet the renewable energy contribution required by Part L of the Building Regulations.
- Sustainability information provided to building occupants
- Smart building technologies. High standard white goods with high energy efficiency ratings will be supplied to all units.
- Low energy LED public lighting shall be designed and specified in accordance with CIBSE lighting guide and Kildare County Council public lighting standards.

In addition, electric vehicle and bicycle parking will be provided within the development which will promote the use of more sustainable modes of transport and reduce potential transport emissions. Full descriptions of the measures proposed, and their benefits are outlined within the Building Lifecycle Report submitted with this application.

11.9 RESIDUAL EFFECTS OF THE PROPOSED DEVELOPMENT

The Proposed Development will result in some impacts to climate through the release of GHGs. TII state that the crux of assessing significance 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”. The Proposed Development has proposed some best practice mitigation measures and is committing to reducing climate impacts where feasible, the development will comply with the do-minimum standards set through regulation (NZEB and Part L 2021). As per the assessment criteria in Section 11.5 the impact of the Proposed Development in relation to GHG emissions is considered **long-term, minor adverse and not significant**.

In relation to climate change vulnerability, it has been assessed that there are no significant risks to the Proposed Development as a result of climate change.

11.10 MONITORING

11.10.1 Construction Phase

We recommend the following monitoring strategies to ensure compliance with the environmental objectives outlined in this EIA. These strategies are essential for effectively managing the environmental impacts associated with the demolition and construction phases, with a particular focus on resource recovery, waste management, and the reduction of greenhouse gas (GHG) emissions.

Compliance with EU Taxonomy for Circular Economy

Given the project's commitment to meeting EU taxonomy requirements, we recommend the following:

- **Comprehensive Documentation and Reporting:** It is essential to maintain detailed records that document compliance with the circular economy principles outlined in the EU taxonomy. This documentation should include logs of all recycled materials, percentages of materials reused on-site, and detailed descriptions of how circular economy practices are being implemented.
- **Independent Third-Party Audits:** We recommend engaging an independent auditor to periodically assess the project's compliance with the EU taxonomy. The audit should verify the accuracy of reported data and ensure that the circular economy requirements are fully adhered to throughout the project.

Monitoring of GHG Emissions Reduction Measures

To mitigate the project's impact on climate change, we propose the following monitoring activities:

- **Appoint sustainability champions** to ensure that the project continues to perform in a sustainable manner including monitoring and reporting of performance on site.
- **Idle Time Monitoring for Vehicles and Machinery:** We suggest installing GPS or telematics systems on all vehicles and machinery used on-site to monitor engine idling times. Automatic alerts should be set up to notify site managers when idling exceeds a specified threshold, enabling prompt corrective action to reduce unnecessary emissions.
- **Maintenance Logs for Plant and Machinery:** Implementing a digital maintenance log system to track the inspection and maintenance of all on-site equipment is recommended. This system should record inspection dates, maintenance activities, and any identified issues, ensuring that all machinery operates efficiently and with minimal emissions.
- **Material Waste Minimisation Tracking:** A monitoring system should be developed to track material orders and usage. This system should identify trends in over-ordering or inefficient material use, enabling the project team to take corrective actions that will help minimise the embodied carbon footprint of the site.

Application of Waste Hierarchy

To optimise waste management on-site, we recommend the following monitoring protocols:

- **Waste Segregation Audits:** Regular audits should be conducted to ensure that waste is being properly segregated according to the waste hierarchy (reduce, reuse, recycle). These audits will help identify opportunities for improving waste management practices and reducing overall waste generation.
- **Monthly Waste Management Reports:** We suggest generating monthly reports detailing the volume of waste reduced, reused, and recycled. These reports should be compared against predefined targets to assess the effectiveness of the waste management strategies and to identify areas for improvement.

Local Sourcing of Materials

To reduce transport-related emissions and support local suppliers, we recommend the following:

- **Supplier Distance Monitoring:** A database of suppliers should be developed, documenting the distance of each supplier from the construction site. This database should be used to monitor and minimise the carbon footprint associated with material transportation, prioritising local suppliers wherever possible.
- **Transport-Related Carbon Footprint Analysis:** Conducting a carbon footprint analysis for the transportation of all materials to the site is recommended. This analysis should inform the selection of suppliers, with a preference for those within a closer radius to reduce CO2 emissions.

These monitoring recommendations are designed to ensure that the project adheres to its environmental commitments, particularly in the areas of resource recovery, waste management, and greenhouse gas emissions reduction. By implementing these strategies, the project will not only comply with regulatory requirements but also contribute to broader environmental sustainability goals. Regular reporting, on-site inspections, and third-party audits will be critical to maintaining compliance and achieving the desired environmental outcomes.

11.10.2 Operational Phase

Environmental Management Plan that incorporates adaptive management principles.

Ensure climate change resilience plans are robust; continued monitoring of trends in weather events; and continued review of resilience measures related to interdependencies.

We recommend the following monitoring strategies to ensure that the Proposed Development meets its environmental objectives. These strategies focus on mitigating the impacts of climate change, enhancing energy efficiency, and promoting sustainable transport, all of which are aligned with best practices outlined in IEMA guidelines.

To ensure the Proposed Development effectively mitigates the impacts of future climate change, we recommend the following monitoring strategies:

Monitoring of Climate Change Mitigation Measures

- **Attenuation and Drainage Systems Monitoring:** Consistent with IEMA's guidance on climate resilience, regular inspections should be undertaken to verify the functionality of the attenuation and drainage systems. These inspections should be conducted during construction, after significant rainfall events, and periodically thereafter to ensure long-term effectiveness in preventing flooding.
- **Climate Vulnerability Assessment Review:** In accordance with IEMA's recommendation to periodically reassess climate risks, we suggest reviewing the climate vulnerability assessment (as detailed in Section 11.5.3) at regular intervals. This review should incorporate the latest climate projections to ensure the mitigation measures remain adequate and effective.

Monitoring of Energy Efficiency and Climate Impact Reduction

To minimise the impact of the development on climate through energy use during operation, the following monitoring activities are recommended:

- **NZEB Compliance Verification:** Continuous monitoring during the construction phase should ensure that the development complies with the Near Zero Energy Building (NZEB) Standards. This includes verifying that all building components and systems meet the NZEB criteria.
- **EU Taxonomy Alignment Monitoring:** Ensure that the development achieves energy performance that is at least 10% lower than the NZEB requirements. Regular energy performance assessments should be conducted to confirm alignment with the EU Taxonomy for sustainable development.
- **Renewable Energy Ratio (RER) Compliance:** Monitor the implementation of renewable energy systems, such as solar panels and air source heat pumps, to ensure that the development achieves a Renewable Energy Ratio (RER) of 20%, in line with Part L (2021) of the NZEB regulations. Post-installation, periodic checks should be performed to verify ongoing compliance.
- **Building Energy Rating (BER) Target Achievement:** Regular energy audits should be carried out to monitor the building's energy performance, ensuring that the targeted Building Energy Rating (BER) of A2/A3 is achieved. This includes verifying the efficiency of insulation, windows, HVAC systems, and other energy-related components.
- **Thermal Performance Monitoring:** Continuous monitoring during construction should ensure that the building achieves the improved thermal transmittance (U-Values), air permeability, and thermal bridging standards specified in the design. Post-construction thermal imaging surveys and air tightness tests should be conducted to confirm that these standards have been met.

Monitoring of Renewable Energy Systems

To ensure the successful implementation and operation of renewable energy systems, the following monitoring measures are recommended:

- **Heat Pump Performance:** Regular inspections and maintenance checks should be conducted on the heat pumps to ensure they are operating efficiently and contributing effectively to the building's energy needs. Performance metrics such as Coefficient of Performance (COP) and Seasonal Performance Factor (SPF) should be tracked and compared against the expected values.
- **Occupant Sustainability Information:** Consistent with IEMA's emphasis on stakeholder engagement, it is important to ensure that all building occupants receive comprehensive sustainability information. This should include guidance on energy conservation practices and how to use renewable energy systems effectively. Feedback mechanisms, such as surveys, should be used to assess the impact of this information on occupant behaviour.

Monitoring of Sustainable Transport Initiatives

To promote sustainable transport and reduce transport-related emissions, we recommend the following monitoring strategies:

- **Electric Vehicle (EV) and Bicycle Parking Usage:** Regular monitoring should be carried out to assess the usage of electric vehicle charging stations and bicycle parking facilities within the development. This will help gauge the effectiveness of these measures in promoting sustainable transport modes. Usage data can inform whether additional facilities or adjustments are needed.
- **Transport Emissions Impact Assessment:** Periodic assessments should be conducted to evaluate the impact of the provided sustainable transport facilities on reducing overall transport emissions. This could include monitoring the uptake of electric vehicles by residents and the corresponding reduction in greenhouse gas emissions.

These monitoring recommendations are designed to ensure that the development's climate change mitigation measures, energy efficiency initiatives, and sustainable transport provisions are effectively implemented and maintained throughout the lifecycle of the project. By adhering to these strategies, the

development will not only comply with relevant regulatory requirements but also contribute to broader environmental sustainability goals. Regular inspections, energy performance assessments, and occupant engagement will be crucial to achieving the desired environmental outcomes.

11.11 REINSTATEMENT

Not applicable to climate.

11.12 INTERACTIONS

Climate interactions with various environmental topics are extensive and significant, highlighting the broad impact of climate factors across different aspects of the environment. One of the most critical interactions is between climate and greenhouse gas (GHG) emissions. The Proposed Development's carbon footprint, which includes emissions from construction activities, energy use, and transportation, plays a role in influencing climate change. Effective management and reduction of these emissions are crucial to mitigate the project's contribution to global warming and to comply with regulatory requirements and sustainability targets.

Interactions between climate and water resources are also notable. Climate variability, such as increased rainfall or prolonged droughts, can affect water availability, quality, and management practices. This includes impacts on stormwater runoff, flood risk, and water supply. The development must incorporate effective water management strategies to address these potential issues and ensure resilience to changing climate conditions.

The relationship between climate and biodiversity is significant as well. Changes in temperature and precipitation patterns can alter habitat conditions, disrupt species distributions, and affect ecological balances. These shifts may impact local flora and fauna, necessitating careful consideration of conservation measures to protect biodiversity within and around the development area.

Soil interactions with climate are critical, with changes in climate affecting soil moisture, erosion rates, and land productivity. Increased rainfall may lead to soil erosion, while extended dry periods can degrade soil quality. Addressing these interactions is essential for maintaining soil health and implementing sustainable land use practices.

Human health and well-being are closely linked to climate factors, with climate change potentially exacerbating health issues such as heat stress, respiratory conditions, and vector-borne diseases. The development's impact on local climate conditions and its potential influence on public health must be carefully assessed to prevent adverse health outcomes. The daylight and sunlight assessment and microclimate / wind assessment of the proposed development is a separate matter to the Climate Chapter of the EIAR and is addressed in standalone reports prepared by GIA accompanying the application.

Cultural heritage sites are also at risk due to climate change, with increased weathering, flooding, and temperature fluctuations potentially accelerating their deterioration. Protecting these valuable resources requires assessing the potential impacts of climate change and implementing appropriate conservation measures.

In summary, the Proposed Development's interactions with climate encompass a range of factors including GHG emissions, water resources, biodiversity, soil, human health, and cultural heritage.

Effective mitigation strategies and robust monitoring will be essential to address these interactions, minimise adverse impacts, and ensure the development's resilience to climate change.

11.13 DIFFICULTIES ENCOUNTERED IN COMPILING

There were no difficulties encountered when compiling this assessment.

11.14 REFERENCES

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RECEIVED: 02/10/2025

Kildare County Council - Inspection Purposes Only

CHAPTER 12

NOISE AND VIBRATION

12.0 NOISE AND VIBRATION

12.1 INTRODUCTION

This chapter of the EIAR provides a description and assessment of the likely effects of the proposed development from noise and vibration.

This chapter discusses the existing ambient noise levels at nearby sensitive receptors, the potential impacts of the proposed development on the existing ambient noise environment and the mitigation measures that may be employed to reduce or eliminate any potential impact.

12.1.1 Expertise & Qualifications

This chapter of the EIAR has been prepared by Wave Dynamics Limited an Acoustic Consultancy specialising in noise and vibration. The EIAR chapter was prepared by Cathal Reck | Acoustic Consultant, Cathal has experience of numerous similar planning stage EIAR noise and vibration assessments. Cathal's qualifications include; BSc (Hons) in Music Technology & Production, IOA Certificate of Competence in Environmental Noise Measurement. Cathal is a member of the Institute of Acoustics.

This chapter was peer reviewed by James Cousins, Managing Director | Principal Consultant with Wave Dynamics who has extensive experience in assessing noise and vibration from road and rail infrastructure on commercial and residential developments. James is an experienced consultant. His qualifications include; BSc (Hons) in Construction Management and Engineering, Pg Cert in Construction Law and Diploma in Acoustics and Noise Control (Institute of Acoustics) and an IOA Competence Cert in Building Acoustic Measurements. James is a member of both Engineers Ireland (MIEI) and the Institute of Acoustics (MIOA) and is the current SITRI Chairman.

This section addresses the potential noise and vibration impact of the proposed Large-Scale Residential Development in Maynooth, Co. Kildare.

12.1.2 Proposed Development

A ten-year permission is sought for development described as follows in the public notices:

“A ten-year planning permission is being sought for a proposed development comprising of 581 no. residential units, a neighbourhood centre and all associated development, on a site of approximately 15.27 hectares.

The residential component of the development consists of 185 no. apartment / duplex apartments and 396 no. houses to be provided as follows:

- 59 no. 2 bed two storey mid terraced houses;
- 52 no. 3 bed two storey mid terrace houses;
- 223 no. 3 bed two storey end terrace/semi-detached houses;
- 58 no. 4 bed two storey semi-detached houses;
- 4 no. 4 bed two storey detached houses;
- 185 no. duplex apartments / apartments (53 no. 1 beds, 92 no. 2 beds, 40 no. 3 beds) in a series of 3 to part 6 storey duplex apartment blocks / apartment blocks.

The proposed neighbourhood centre consists of 3 no. buildings (Block A, Block B and a single storey standalone café / restaurant kiosk building) and a new public plaza and communal open space. Block A is part 5 storey / part 6 storey building comprising health centre (174 sq.m) and two no. shop units (124 sq.m pharmacy and 166 sq.m convenience shop) at ground floor level and 41 no. apartments (17 no. 1 beds and 24 no. 2 beds) from first to fifth floor level. Block B is a 5 storey building block comprising a childcare facility (762 sq.m) at ground floor level and 48 no. apartments (21 no. 1 beds and 27 no. 2 beds) from first to fourth floor level.

96 no. duplex apartments units (12 no. 1-bed, 48 no. 2-bed, and 36 no. 3-bed units) are provided in 5 no. blocks (Blocks 1 to 5) ranging from 3 no. storeys to 5 no. storeys. All duplex apartments and apartment units are provided with a balcony, terrace or private garden on all elevations.

A total of 888 no. surface car parking spaces are proposed for residential units, visitor parking and the neighbourhood centre commercial uses. A total of 623 no. cycle spaces are proposed for long stay/residents, 42 no. spaces for the neighbourhood centre commercial uses and 93 no. short stay/visitor cycle parking spaces.

The proposal includes significant public open space including a new Local Park, linear park and pocket parks, children's play areas and ancillary play area for the childcare facility. The development includes hard and soft landscaping, lighting, boundary treatments and communal open space areas.

The proposed development provides for two no. vehicular accesses from the permitted Maynooth Eastern Ring Road (MERR), including a new pedestrian/cyclist signalised crossing, associated internal roads, pedestrian and cycle infrastructure, set down areas, bin and bike stores, paths and access points provided up to the application site boundary to provide for potential future connections to adjoining lands to the north and south.

The development includes foul and surface water drainage, 6 no. ESB Substations, green roofs, PV panels, plant, services and all associated and ancillary site works and development."

Additional information and further development description can be found in Chapter 2 of the EIAR.

12.1.3 Aspects Relevant to This Assessment

Aspects of the proposed development and the surrounding area which are relevant to this assessment are as follows:

- Noise emissions arising during construction which may impact surrounding receptors;
- Cumulative noise impacts at surrounding receptors may arise where construction works coincide with other nearby construction works;
- Groundborne vibration arising during construction may impact surrounding structures;
- The proposed development may give rise to local increases in road traffic noise which may affect surrounding receptors;
- The proposed childcare facility may give rise to noise emissions affecting surrounding receptors;
- There is an onus on the applicant to ensure that internal living spaces at the proposed development, and noise levels at external amenity areas, meet relevant criteria; and
- In assessing internal and external amenity noise levels, it is necessary to consider existing traffic noise levels, as well as future changes in road traffic noise due to changing traffic volumes and altered road layouts.
- Inward noise impact from the existing noise sources and the new MERR.

12.2 STUDY METHODOLOGY

This assessment will examine the likely impacts of sound pressure levels generated by the proposed development located at Railpark, Maynooth, Co. Kildare. Noise calculations have been used to predict and assess the likely impact of facility operations on noise sensitive receptors.

For the purpose of the assessment 'sensitive receptors' terminology used describes any persons, locations or otherwise that may be susceptible to changes as a consequence of the proposed development. The primary noise impacts associated with the proposed development are likely to be due to:

- Site clearance works;
- Building construction works;
- Vehicles entering and existing the site;
- Plant and equipment; and
- Traffic along local road network.

The assessment of the noise and vibration impacts has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out within the relevant sections of this chapter. In addition to specific noise guidance documents, the following guidelines were considered and consulted for the purposes of this chapter:

- Design Manual for Roads and Bridges Volume 11 Section 3 Part 7 (HD 213/11 – Revision 1) (The Highways Agency et al., 2011);
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings;
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise;
- BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Vibration
- ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures;
- ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise Part 2: Determination of sound pressure levels;
- ISO 9613-1:1993 Acoustics - Attenuation of sound during propagation outdoors -- Part 1: Calculation of the absorption of sound by the atmosphere;
- ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors -- Part 2: General method of calculation;
- British Standard BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings.
- Environmental Protection Agency (2016) Guidance Note for Noise (NG4): Licence Applications, Surveys and Assessments in Relation to Scheduled Activities;
- BS 4142:2014+A1:2019: Methods for rating and assessing industrial and commercial sound.
- Guidelines for the Treatment of Noise & Vibration in National Road Schemes, National Roads Authority, Revision 1, 25th October 2004; and
- Dublin Agglomeration Noise Action Plan 2024 – 2028.

The noise and vibration study has been undertaken using the following methodology:

- A baseline environmental noise survey has been undertaken in the vicinity of the subject site in order to characterise the existing baseline noise environment and to assess the character of the existing noise.
- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development.
- Predictive statistical calculations have been performed during the construction phase of the project at the nearest sensitive locations to the development site.
- Predictive modelling using SoundPlan 9.0 and statistical calculations have been performed to assess the potential impacts associated with the operational phase of the development at the most sensitive locations surrounding the development site; and
- Mitigation measures have been proposed to reduce, where necessary, the identified potential outward impacts relating to noise and vibration from the proposed development.
- The use of the previous Noise Impact Assessment for the MERR (reference)

12.2.1 Desk Study

The noise assessment reviews all existing information relating to the site and its environs, which involves a desk-based study of the following:

- Baseline noise monitoring has been undertaken by Wave Dynamics. Data collected from these surveys provides a baseline assessment for the site and is used to assess any future noise-related impacts of activities associated with the proposed development;
- An evaluation of the site and the surrounding area to assess certain changes that are likely to impact the surrounding environs;
- Identification of sensitive receptors for assessment; and
- BS 5228 2009 +A1 2014 Code of practice for noise and vibration control on construction and open sites with respect to the controlling noise and vibration impacts. In this instance, appropriate criteria relating to permissible construction noise levels are taken from Part one of the standard Noise.
- Maynooth Eastern Ring Road Part VIII Planning Report 2019

12.2.2 Assessment Criteria

This section outlines the criteria for the construction phase and operational phase of the proposed development.

12.2.2.1 Construction Phase – Noise

Dublin Agglomeration Noise Action Plan 2024-2028

The Dublin Agglomeration Noise Action Plan has not outlined specific construction noise limits, therefore noise limits outlined in BS5228-1:2009+A1 have been adopted as the criteria for this project. BS5228-1 takes into consideration the impact of the ambient noise at the noise sensitive receptor as follows:

Table 12.1: BS5228 threshold levels.

Assessment category and threshold value period	Threshold value, in decibels (dB) (L _{Aeq})		
	Category A ¹	Category B ²	Category C ³
Daytime (07:00hrs – 19:00hrs) and Saturdays (07:00hrs – 14:00hrs)	65	70	75
Evenings and weekends ⁴	55	60	65
Night-time (23:00hrs – 07:00hrs)	45	50	55

Note 1: Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Note 2: Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Note 3: Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category B values.

Note 4: 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sunday.

12.2.2.2 Construction Phase – Vibration

BS 5228-2 2009 A12014 Noise and Vibration Control of Open Sites

The Dublin Agglomeration Noise Action Plan 2024-2028 does not contain guidance relating to vibration limits. Best practice guidance is taken from British Standard BS 5228:2009 + A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 2 Vibration.

The standard recommends that for a soundly constructed residential property and similar structures (in good repair), the threshold for minor or cosmetic (i.e. non- structural) damage should be taken as a Peak Particle Velocity (PPV) (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:

Table 12.2: Likely Construction Noise Impact.

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:			
Building Type	Less than 15Hz	15 to 40Hz	40Hz and above
Light framed structures/ residential buildings	15 mm/s	20 mm/s	50 mm/s

12.2.2.3 Operational Phase – Noise

This section outlines the criteria for the operational phase of the development.

Dublin Agglomeration Noise Action Plan 2024 – 2028

The Dublin Agglomeration Noise Action Plan 2024 – 2028, does not include any specific noise limits with regard to operational noise of commercial premises. Guidance has been sought from other applicable standards for such noise limits, EPA NG4 Guidance note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities has been adopted and used throughout the assessment.

BS 4142:2014: Methods for Rating and Assessing Industrial and Commercial Sound.

BS4142 describes a method for the assessment of commercial, industrial and background noise to quantify its impact on persons outside of a residential dwelling. BS 4142 has become the de facto standard for compliance investigation. In addition to the specified broadband noise levels the standards provide objective and subjective methods for the assessment of the impulsivity and tonality of the noise sources. This allows for a penalty/ correction to be applied to the measured noise level of the source (L_{Aeq}) to give the rating level ($L_{Ar,T}$).

It considers the likelihood of complaints by considering the margin by which the noise in source the background noise level.

BS 4142 states that an exceedance of the noise source of the background noise by:

- +10 dB or more indicates that complaints are likely,
- + 5 dB is of marginal significance, and;
- The rating level is more than 10 dB below the measured background noise level, then this is a positive indication that complaints are unlikely.

BS4142 outlines guidance for penalty corrections to be applied to the noise sources in question should the noise source have one of the following characteristics:

- The noise contains a distinguishable, discreet, continuous tone (whine, or hum);
- The noise contains distinct impulses (i.e. bangs),
- The noise is intermittent or,
- The noise is irregular.

EPA NG4: Guidance note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities.

EPA NG4 outlines that noise attributable solely to onsite activities from a licenced premises should not exceed the following limits:

- Daytime (07:00hrs – 19:00hrs) – 55dB $L_{Ar,T}$
- Evening (19:00hrs – 23:00hrs) – 50dB $L_{Ar,T}$
- Night time (23:00hrs – 07:00hrs) – 45dB $L_{Aeq,T}$

During daytime and evening periods rigorous efforts should be made to avoid clearly audible tones and impulsive noise at all sensitive locations. A penalty of 5dB for tonal and/or impulsive elements is to be

applied to the daytime and evening measured $L_{Aeq,T}$ values to determine the appropriate rating level ($L_{Ar,T}$). In all cases, an assessment by a competent person will be required.

During the night-time period no tonal or impulsive noise from the facility should be clearly audible or measurable at any NSL.

12.2.2.4 Operational Phase – Vibration

There are no specific vibration criteria for buildings in Ireland. The vibration criteria for this project are based on BS 5228-2:2009+A1:2014, which provides guidance relating to the assessment of human response to vibration in terms of PPV. Table 12.3 below outlines the range of vibration values and the associated potential effects on humans.

Table 12.3: Project vibration criteria.

Vibration Level, PPV	Effect
0.14mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies. At lower frequencies people are less sensitive to vibration.
0.3mm/s	Vibration might be just perceptible in residential environments.
1mm/s	It is likely that a vibration level of this magnitude in residential environments will cause complaint.

Vibrations typically become perceptible between 0.15mm/s to 0.3mm/s and may become annoying or disturbing at higher magnitudes. Higher levels of vibration are tolerated for single events or events of short duration, particularly during construction projects. For example, groundbreaking or piling can typically be tolerated at vibration levels up to 2.5mm/s if adequate public relations are in place and timeframes are known.

12.2.2.5 ProPG Professional Practice Guidance on Planning & Noise

ProPg 2017 is used to assess airborne noise from transport sources including road, rail and aircraft noise. The aim of the document is to provide a good design process which considers the internal acoustic environment at an early stage in the design process. The guidance was prepared by the Institute of Acoustics, the Association of Noise Consultants and the Chartered Institute of Environmental Health and is based on the findings by the World Health Organisation in relation to noise impact on humans. Its adoption is considered best practice for assessing the potential noise impact on the future occupants for residential developments.

The guidance is primarily designed for residential developments however it can be applied to other development types including developments where people require appropriate noise levels for rest and sleep. This includes residential care homes, hospitals etc. The guidance advocates a holistic design process which considers the site, its location and likely suitability for the development at an early stage.

The two primary stages of the ProPG design approach are summarised as follows:

Stage 1 – The first stage is to undertake an initial high-level noise risk assessment of the proposed site considering the noise levels (measured and or predicted) to identify any noise risks. This would include consideration of the current noise environment, future use and future noise levels; and,

Stage 2 –The second stage is a full detailed assessment of the proposed development covering the “Four Key Elements”:

1. *“Good Acoustic Design Process,*
2. *Internal Noise Level Guidelines,*
3. *External Amenity Area Noise Assessment; and*
4. *Assessment of Other Relevant Issues.”*

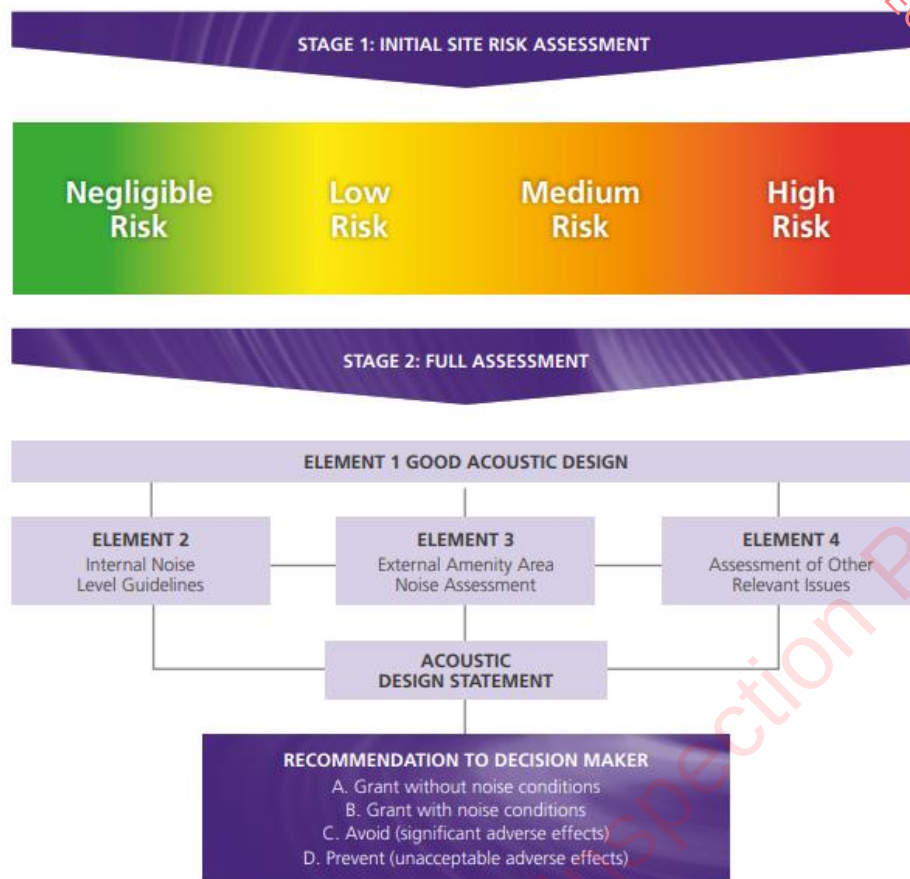
As part of the process an Acoustic Design Statement is produced and submitted to the planning authority. This document sets out the design process used to come to the conclusions and recommendations in the report.

Following the ProPg the following conclusions are recommended by ProPG in relation to the findings of the Acoustic Design Statement based on the recommendations of the Acoustic Consultant:

- a. *“Planning consent may be granted without any need for noise conditions;”*
- b. *“Planning consent may be granted subject to the inclusion of suitable noise conditions; “*
- c. *“Planning consent should be refused on noise grounds in order to avoid significant adverse effects (“avoid”); or, “*
- d. *“Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects (“prevent”).”*

Section 3 of the ProPG outlines the recommended approach decision makers should following in coming to their conclusions based on the recommendations of the Acoustic Design Statement.

Figure 12.1 on the next page illustrates the ProPG approach.

Figure 12.1: Summary of overall ProPG approach.

12.2.2.5.1 Internal Noise Levels

Table 12.4: BS 8233:2014 internal noise criteria –Residential Buildings outlines the recommended internal noise levels from BS 8233:2014 within living accommodation for residential buildings for dining, resting and sleeping. These limits are in line with the ProPG and the World Health Organisation Guidelines.

Table 12.4: BS 8233:2014 internal noise criteria –Residential Buildings

Activity	Location	07:00 to 23:00 Hrs	23:00 to 07:00 Hrs
Resting	Living Room	35 dB $L_{Aeq, 16 \text{ hour}}$	-
Dining	Dining Room/Area	35 dB $L_{Aeq, 16 \text{ hour}}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16 \text{ hour}}$	30 dB $L_{Aeq, 8 \text{ hour}}$ 45dB L_{AFmax} (See Note 1)

1: Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB L_{AFmax} more than 10 times a night.

12.2.2.5.2 External Amenity Space Noise Levels

With regard to noise levels in external amenity spaces ProPG 2017 refers to the BS8233:2014 guidance which states that:

“the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$ ”.

It also states that:

“These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited.”

After mitigation/with mitigation if the adverse noise impacts are still above the recommended noise levels they can be offset by providing an alternative amenity space to partially offset the noise impact by providing access to:

- *“a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or*
- *a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or*
- *a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations.”*

BS 8233:2014 elaborates on this further, it acknowledges that it may not always be necessary or feasible to ensure that noise levels remain within the guideline values. In respect of gardens and patios, BS 8233:2014 states:

“however it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.”

Both BS8233:2014 and ProPG 2017 do not advise that development should be restricted in areas with undesirable noise levels. The standards recommend that mitigation measures are put in place where practicable to achieve the recommended noise levels for the external amenity spaces. It notes that this may not be practical in all situations and local or governmental policy should take precedence in these situations.

12.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

A baseline noise survey was conducted at the site located in Railpark, Maynooth, Co. Kildare, to assess the impact of road noise. The purpose of the survey was to quantify the existing noise environment to predict its impact on the future occupants of the development.

An unattended and attended noise survey was conducted to quantify the existing noise environment. The attended measurement survey also included measurements across the site for calibration of the distance attenuation calculations and noise model. Attended measurements were undertaken on the 31st of July 2024 and the 6th of August 2024. The noise logger was deployed on the 17:45hrs on the 31st of July 2024 to 12:15hrs on the 6th of August 2024.

12.3.1 Site Description and Measurement Locations

The site is located in Railpark, Maynooth, Co. Kildare. The development site is bounded by an existing residential estate to the West, and a small cluster of residential dwellings to the East. To the North and South are green fields and a sparse scattering of residential dwellings.

Figure 12.2: Site location and measurement locations A1-A3 and L1.



12.3.2 Survey Methodology and Personnel

The surveys were completed by Daniel Cousins (Field Engineer), the unattended and attended noise measurements were undertaken from 17:45hrs on the 31st of July 2024 to 12:15hrs on the 6th of August 2024. Attended measurements were undertaken on the 31st of July 2024 and the 6th of August 2024.

12.3.2.1 Unattended Noise Measurements

An unattended noise logger was deployed in location L1. The logger was calibrated before and after the measurements and no significant drift was noted. The logger was deployed at a height of approximately 3.5m above the ground and measurements were filtered for periods of unsuitable weather conditions.

12.3.2.2 Attended Noise Measurements

Noise measurements were undertaken in general accordance with ISO 1996-1:2016 using ISO Class 1 sound analysers. Attended measurements were taken for a duration of 15 minutes in the locations A1-A3 as noted in Figure 12.2. Care was taken to avoid any effect on the measurement of extraneous noise, acoustic vibration, or interference. During the attended noise measurements, the sound level meter was positioned at approximately 1.5m above the ground level. The weather conditions were calm (wind less than 5m/s) with no rain, a wind shield was used for the duration of the attended surveys. The noise logger was calibrated before and after the survey and no significant drift was noted.

Figure 12.3: Unattended Measurement Setup at location L1.



12.3.2.3 Survey Period

The unattended and attended noise measurements were undertaken from 17:45hrs on the 31st of July 2024 to 12:15hrs on the 6th of August 2024. Attended measurements were undertaken on the 31st of July 2024 and the 6th of August 2024.

12.3.2.4 Subjective Noise Environment

During the attended noise survey following noise sources were identified:

- Traffic noise from nearby roads.
- Aircraft overhead.
- Low wind generated foliage noise.

12.3.3 Noise Measurement Equipment

A Class 1 sound level meter/noise logger in general accordance with IEC 61672-1:2013 was used for the attended measurements. Table 12.5 below summarises the measurement equipment used.

Table 12.5: Noise Measurement Equipment.

Description	WD Asset Number	Model	Serial No.	Calibration Certificate No.	Calibration Due Date
Calibrator	CAL3	Nor 1251	32096	AC240251	03/07/2025
Calibrator	CAL4	Larson Davis CAL200	21085	AC240249	29/06/2025
Sound Level Meter	SLM1	Nor 140	1405554	U45343/U45344/U45342	27/07/2025
Sound Level Meter	SLM7	Nor140	1405924	U48184	25/06/2026

12.3.3.1 Noise Measurement Results

Attended and unattended measurements were taken to measure the existing noise climate in the area. This section outlines the results of the attended noise measurements.

12.3.3.2 Attended Measurement Results

Table 12.6 outlines the results of the attended measurement survey.

Table 12.6: Attended measurement results.

Measurement				Measured Noise Levels		
Location	Date	Time (hrs)	Duration (mins)	L _{Aeq} dB	L _{AFmax} dB	L _{A90} dB
A3	31/07/2024	15:00	15	47	63	43

Measurement				Measured Noise Levels		
Location	Date	Time (hrs)	Duration (mins)	L _{Aeq} dB	L _{AFmax} dB	L _{A90} dB
A3	31/07/2024	15:19	15	46	57	43
A2	06/08/2024	10:09	60	48	63	46
A1	06/08/2024	11:38	15	47	58	47
A1	06/08/2024	11:53	15	50	62	48

12.3.3.3 Sound Exposure Levels

This section outlines the instances where an aircraft was recorded flying overhead during the daytime hours only.

12.3.3.4 Aircraft

Table 12.7 below outlines the measured sound exposure levels for aircraft passes overhead at the development.

Table 12.7: Aircraft SEL results.

Aircraft Movement/Direction	Date	Location	Time	Duration (Seconds)	L _{Aeq} dB	L _{AFmax} dB	SEL dB
Easterly/Landing	31/07/2024	A2	16:02	43	47	51	63

12.3.3.5 Unattended Monitoring Results

Table 12.8 outlines the results of noise measurements at the unattended monitoring location L1. A full breakdown of all of the unattended measurement results are provided in Appendix 12.1.

Table 12.8: Unattended measurement results.

Start Date	L _{Aeq,16hour} (07:00 – 23:00) dB	L _{night} (L _{Aeq,8hour} 23:00 – 07:00) dB	L _{den} (00:00 – 00:00) dB	10 th highest night-time L _{AFmax} dB	L _{AF90} (23:00 – 07:00) dB
31/07/2024	49 ⁽¹⁾	45	53 ⁽¹⁾	54	39
01/08/2024	47	50	53	58	44
02/08/2024	53	47	56	57	43
03/08/2024	50	45	54	55	40

Start Date	L _{Aeq,16hour} (07:00 – 23:00) dB	L _{night} (L _{Aeq,8hour} 23:00 – 07:00) dB	L _{den} (00:00 – 00:00) dB	10 th highest night-time L _A F _{max} dB	L _{AF90} (23:00 – 07:00) dB
04/08/2024	54	48	55	59	44
05/08/2024	50	51	55	60	45
06/08/2024	54 ⁽¹⁾	N/A	N/A	N/A	N/A

(1) Shortened measurement duration.

(2) Where night-time period is referred to the date is the date the measurement commenced on at 23:00hrs and finished at 07:00hrs on the following calendar day.

12.3.4 Discussion of Measurement Results

The ambient noise consisted of traffic noise from local roads in the surrounding area and the noise from aircraft overhead.

12.3.4.1 Weather Conditions for Monitoring Period

Good weather conditions were noted in general during the deployment and collection during the attended survey, with winds of less than 5 m/s and no rain for the attended surveys.

Where weather conditions during the unattended survey impacted on the results they were filtered where required.

12.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A ten-year planning permission is being sought for a proposed development comprising of 581 no. residential units, a neighbourhood centre and all associated development, on a site of approximately 15.27 hectares.

The residential component of the development consists of 185 no. apartment / duplex apartments and 396 no. houses to be provided as follows:

- 59 no. 2 bed two storey mid terraced houses;
- 52 no. 3 bed two storey mid terrace houses;
- 223 no. 3 bed two storey end terrace/semi-detached houses;
- 58 no. 4 bed two storey semi-detached houses;
- 4 no. 4 bed two storey detached houses;
- 185 no. duplex apartments / apartments (53 no. 1 beds, 92 no. 2 beds, 40 no. 3 beds) in a series of 3 to part 6 storey duplex apartment blocks / apartment blocks.

The proposed neighbourhood centre consists of 3 no. buildings (Block A, Block B and a single storey standalone café / restaurant kiosk building) and a new public plaza and communal open space. Block A is part 5 storey / part 6 storey building comprising health centre (174 sq.m) and two no. shop units (124 sq.m pharmacy and 166 sq.m convenience shop) at ground floor level and 41 no. apartments (17 no. 1 beds and 24 no. 2 beds) from first to fifth floor level. Block B is a 5 storey building block comprising a childcare facility (762 sq.m) at ground floor level and 48 no. apartments (21 no. 1 beds and 27 no. 2 beds) from first to fourth floor level.

96 no. duplex apartments units (12 no. 1-bed, 48 no. 2-bed, and 36 no. 3-bed units) are provided in 5 no. blocks (Blocks 1 to 5) ranging from 3 no. storeys to 5 no. storeys. All duplex apartments and apartment units are provided with a balcony, terrace or private garden on all elevations.

A total of 888 no. surface car parking spaces are proposed for residential units, visitor parking and the neighbourhood centre commercial uses. A total of 623 no. cycle spaces are proposed for long stay/residents, 42 no. spaces for the neighbourhood centre commercial uses and 93 no. short stay/visitor cycle parking spaces.

The proposal includes significant public open space including a new Local Park, linear park and pocket parks, children's play areas and ancillary play area for the childcare facility. The development includes hard and soft landscaping, lighting, boundary treatments and communal open space areas.

The proposed development provides for two no. vehicular accesses from the permitted Maynooth Eastern Ring Road (MERR), including a new pedestrian/cyclist signalised crossing, associated internal roads, pedestrian and cycle infrastructure, set down areas, bin and bike stores, paths and access points provided up to the application site boundary to provide for potential future connections to adjoining lands to the north and south.

The development includes foul and surface water drainage, 6 no. ESB Substations, green roofs, PV panels, plant, services and all associated and ancillary site works and development.

12.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

This section outlines the potential impact of the proposed development.

12.5.1 Demolition Phase

There will be no demolition works associated with the development.

12.5.2 Assessment Criteria for Construction Phase – Noise

Kildare County Council have not outlined specific construction noise limits within the Dublin Agglomeration Noise Action Plan Chapter 13, therefore noise limits outlined in BS5228-1:2009+A1 have been adopted as the criteria for this project. BS5228-1 takes into consideration the impact of the ambient noise at the noise sensitive receptor as follows:

Table 12.9: BS5228 threshold levels.

Assessment category and threshold value period	Threshold value, in decibels (dB) (LAeq)		
	Category A ¹	Category B ²	Category C ³
Daytime (07:00 – 19:00) and	65	70	75
Saturdays (07:00 – 14:00)			

Assessment category and threshold value period	Threshold value, in decibels (dB) (LAeq)		
	Category A ¹	Category B ²	Category C ³
Evenings and weekends ⁴	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

Note 1: Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Note 2: Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Note 3: Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category B values.

Note 4: 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sunday

BS5228 defines a noise sensitive location as:

“any occupied premises outside a site used as a dwelling (including gardens), place of worship, educational establishment, hospital or similar institution, or any other property likely to be adversely affected by an increase in noise level”.

12.5.3 Assessment Criteria for Construction Phase – Vibration

The Dublin Agglomeration Noise Action Plan – Chapter 13 does not contain guidance relating to vibration limits. Best practice guidance is taken from British Standard BS 5228:2009 + A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 2 Vibration.

The standard recommends that for a soundly constructed residential property and similar structures (in good repair), the threshold for minor or cosmetic (i.e. non- structural) damage should be taken as a Peak Particle Velocity (PPV) (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:

Table 12.10: Allowable vibration limits.

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:			
Building Type	Less than 15Hz	15 to 40Hz	40Hz and above
Light framed structures/ residential buildings	15 mm/s	20 mm/s	50 mm/s

12.5.4 Assessment Criteria for Operational Phase - Noise

The main potential source of operational noise from the development is plant, traffic movements and car parking, external/public amenity spaces and creche play areas.

The Dublin Agglomeration Noise Action Plan – Chapter 13 doesn't specify any operation noise limits typically most councils define these as follows:

Daytime 55 dB (A) Leq

Night-time 45 dB (A) Leq (or exceptionally 40 dB(A) Leq)

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 12.11 below offers guidance as to the likely impact associated with any particular change in traffic noise level (Source DMRB, 2011).

Table 12.11: Magnitude of impacts.

Noise Change, dB	Magnitude of Impact
0	No Change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 – 9.9	Moderate
10+	Major

12.5.4.1 BS 4142: Methods for Rating and Assessing Industrial and Commercial Sound.

BS 4142 states that an exceedance of the noise source of the background noise by:

- +10 dB or more indicates that complaints are likely,
- + 5 dB is of marginal significance, and;
- The rating level is more than 10 dB below the measured background noise level, then this is a positive indication that complaints are unlikely.

BS4142 outlines guidance for penalty corrections to be applied to the noise sources in question should the noise source have one of the following characteristics:

- The noise contains a distinguishable, discreet, continuous tone (whine, or hum);
- The noise contains distinct impulses (i.e. bangs),
- The noise is intermittent or:
- The noise is irregular.

12.5.4.2 EPA NG4: Guidance note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities.

EPA NG4 outlines that noise attributable solely to onsite activities from a licenced premises should not exceed the following limits:

- Daytime (07:00hrs – 19:00hrs) – 55dB L_{Ar,T}
- Evening (19:00hrs – 23:00hrs) – 50dB L_{Ar,T}
- Night time (23:00hrs – 07:00hrs) – 45dB L_{Aeq,T}

During daytime and evening periods rigorous efforts should be made to avoid clearly audible tones and impulsive noise at all sensitive locations. A penalty of 5dB for tonal and/or impulsive elements is to be applied to the daytime and evening measured L_{Aeq,T} values to determine the appropriate rating level (L_{Ar,T}). In all cases, an assessment by a competent person will be required.

During the night-time period no tonal or impulsive noise from the facility should be clearly audible or measurable at any NSL.

12.5.5 Vibration

There are no specific vibration criteria for buildings in Ireland. The vibration criteria for this project are based on BS 5228-2:2009+A1:2014, which provides guidance relating to the assessment of human response to vibration in terms of PPV. Table 12.12 below outlines the range of vibration values and the associated potential effects on humans.

Table 12.12: Project vibration criteria.

Vibration Level, PPV	Effect
0.14mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies. At lower frequencies people are less sensitive to vibration.
0.3mm/s	Vibration might be just perceptible in residential environments.
1mm/s	It is likely that a vibration level of this magnitude in residential environments will cause complaint.

Vibrations typically become perceptible between 0.15mm/s to 0.3mm/s and may become annoying or disturbing at higher magnitudes. Higher levels of vibration are tolerated for single events or events of short duration, particularly during construction projects. For example, groundbreaking or piling can typically be tolerated at vibration levels up to 2.5mm/s if adequate public relations are in place and timeframes are known.

12.5.6 Construction Phase

12.5.6.1 Noise Limits

The criteria for the project is based on the criteria outlined in Table 12.13 and the background noise in the area. The project criteria for construction noise are outlined below in Table 12.13 distance to the NSLs is based on the closest receiver for each NSL where the NSL reflects a number of houses/sensitive receivers at each NSL. Reference to the baseline survey results and guidance contained in BS 5228 Part 1 for construction noise levels threshold for significance affect from constriction activities is set as follows for the closest noise sensitive locations:

Figure 12.4: Site Location, measurement locations A1-A3 and L1, and noise sensitive locations.**Table 12.13: Construction noise limits.**

Noise Sensitive Location	Distance To the Centre of The Site (m)	Ambient Noise dB(A) L_{eq}	Noise Limit dB(A) L_{eq} ¹
NSL1	290	48	65
NSL2	600	47	65
NSL3	510	47	65
NSL4	590	47	65
NSL5	490	50	65
NSL6	310	50	65
NSL7	390	50	65

1) 65 dB (A) lower threshold limit

For the appropriate assessment period (i.e. daytime in this instance) the ambient noise level is determined and rounded to the nearest 5dB. If the noise generated by construction activities exceeds the appropriate category value, then a significant effect is deemed to occur.

For large infrastructure projects a limit of 65dB(A) is set as the appropriate the upper limit for construction noise within urban areas near main roads in heavy industrial areas. This is considered an appropriate upper limit for construction noise.

12.5.7 Construction Noise Predictions

Construction noise for the site has been predicted based on the information provided. A summary of the expected equipment, noise levels and operating times are provided in Table 12.14. The noise sources are assumed to be located at the centre of the site. The prediction methodology in BS5228 has been used to calculate the noise level over a typical day for each of the main construction stages.

The closest noise sensitive receptors are the residential dwellings with a line of sight to the proposed development located at NSL1 and NSL6 in Table 12.15.

Table 12.14: Proposed construction equipment, noise levels and duration.

Construction Phase	Item of Plant (BS 5228-1:2009+A1:2014)	Noise Level	On Time of 10 hr day
	Ref)	(L_{Aeq} at 10m dB(A))	
Site Setup	Digger	77	4 Hours
	Carpentry tools	78	2 Hours
	Skill saw	84	2 Hours
Substructure	Excavators	77	2 Hours
	Con Saws	84	3 Hours
	Rail Saw	85	2 Hours
	Drills (Into Concrete)	89	3 Hours
	Dumper	81	4 Hours
	Cement Mixer (Discharging)	75	4 Hours
	Lorry Idling	80	2 Hours
	Telescopic Handler	71	4 Hours
	Cement Pump	78	3 Hours
Superstructure	Drills (Into Concrete)	89	2 Hours

Construction Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref)	Noise Level (L_{Aeq} at 10m dB(A))	On Time of 10 hr day
	Power Tools	70	3 Hours
	Impact Steel	69	2 Hours
	Hammer	69	1 Hour
	Dumper	81	3 Hours
	Cement Mixer (Discharging)	75	2 Hours
	Lorry Idling	80	2 Hours
	Telescopic Handler	71	5 Hours
External finishes	Hand Tools	70	5 Hours
	Power Tools	70	2 Hours
Internal finishes	n/a	n/a	n/a

Table 12.15 summarises the predicted construction noise level at the noise sensitive locations. Examination of the results indicate the construction noise without mitigation is predicted to exceed the noise limits during the substructure and superstructure stages of the development.

Table 12.15: Predicted noise levels without mitigation for each stage.

Predicted cumulative noise level (construction noise + ambient)					
Location	Noise Limit	With <u>no</u> mitigation			
		L_{Aeq} , dB			
		Site Set Up	Substructure	Superstructure	External finishes
NSL1	65	65	72	69	55
NSL2	65	62	69	66	52
NSL3	65	62	70	67	53
NSL4	65	62	69	66	52
NSL5	65	63	70	67	53
NSL6	65	65	72	69	54

Predicted cumulative noise level (construction noise + ambient)					
Location	Noise Limit	With <u>no</u> mitigation			
		L _{Aeq} , dB			
		Site Set Up	Substructure	Superstructure	External finishes
NSL7	65	64	71	68	54

The calculations set out above are based on assumed site construction works and a combination of the plant operating at the same time i.e. worst-case scenario on each site at the same time. In reality this will not be the case however the assessment has been based on worst case scenario.

Table 12.16: Attenuation required based on the construction noise predictions.

Location	Noise Limit	Noise reduction required at each stage of works to meet criteria (dBA)			
		Site Set Up	Substructure	Superstructure	External finishes
NSL1	65	0	7	4	0
NSL2	65	0	4	1	0
NSL3	65	0	5	2	0
NSL4	65	0	4	1	0
NSL5	65	0	5	2	0
NSL6	65	0	7	4	0
NSL7	65	0	6	3	0

Noise mitigation measures will be required at all stages of construction. A combination of the mitigation measures outlined in Section 12.8 should be used to reduce the levels of construction noise by the values listed Table 12.16.

12.5.7.1 Traffic from Construction Vehicles

12.5.7.2 Construction Traffic Figures

Table 12.17 below outlines the construction traffic figures provided by Roughan & O'Donovan Consulting Engineers for the use in this assessment.

Table 12.17: AADT Figures per Link (Construction Phase)

Road Link Name	Existing AADT	Construction AADT	% Change
Griffin Rath Manor	1353	1375	2%
R405	6698	6901	3%
Dunboyne Road	8418	8463	1%
R148	9458	9643	2%

12.5.7.3 Construction Traffic Predictions

Based on the figures outlined above in Section 12.5.7.2 the construction phase of the development is expected to contribute minimal traffic volumes in the area. The increase in traffic related noise levels over baseline figures is predicted to be no more than 0.5dBA at the noise sensitive receptors identified for this project. Table 12.18 below outlines the total traffic increase from the base year to the construction. Additionally, Table 12.19 below outlines the magnitude of impact based on the increased construction traffic on the surrounding roads.

Table 12.18: Total additional traffic across all AADT links.

Total Traffic Volumes for Each Scenario		Total Additional Traffic Volume Over Base Year	% Increase over Base Year
2024 Base	25927	-	-
Construction	26382	455	2%

Table 12.19: Likely effect associated with change in construction traffic noise levels.

Magnitude of Impact	Increase in Traffic Noise Levels (dB)
No Impact	Less than 1.0
Minor	Greater than or equal to 1.0 and less than 3.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Major	Greater than or equal to 5.0

12.5.7.4 Construction Vibration

Vibration impact is not anticipated for most of the construction stage, some vibration is expected to be generated during the substructure stage where piling operations are proposed. During this phase, compliance with vibration criteria is evaluated using a combination of measured data and general estimates, as predicting vibration impacts over distance is challenging due to variations in soil composition and ground conditions. While precise predictions are difficult to achieve, general estimates based on measured vibration levels at specific distances, as outlined in BS5228-2, provide a practical method for assessing potential impacts, as outlined below in Table 12.20.

Table 12.20: Construction Vibration Criteria.

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:

Building Type	Less than 15Hz	15 to 40Hz	40Hz and above
Light framed structures/ residential buildings	15 mm/s	20 mm/s	50 mm/s

12.5.8 Operational Noise

12.5.9 Operational Noise Predictions

12.5.9.1 Plant Noise

The operational phase of the development will feature noise from plant and equipment located on the development. The specific plant and equipment are not available at this stage of the design therefore example data from similar air source heat pumps (ASHPs) have been used in the assessment.

Table 12.21: Plant Sound Power Spectrums.

Description	Octave Band Sound Power Level L_W dB at Centre Frequency (Hz)								Overall Sound Power Level L_{WA} dB
	63	125	250	500	1000	2000	4000	8000	
Residential ASHP (Mitsubishi Ecodan for reference)	53	53	52	51	50	49	48	47	53

The octave band spectrum values for the plant and equipment units have been extrapolated from single figure sound power data provided by the manufacturer.

12.5.9.2 External Amenity & Creche Noise

The operational phase of the development will feature noise from the usage of external amenity spaces, playgrounds and the creche located around the development. Table 12.22 below outlines the spectrum used to model these spaces.

Table 12.22: External amenity space & Creche noise sound power spectrums.

Description	Octave Band Sound Power Level L_W dB at Centre Frequency (Hz)								Overall Sound Power Level L_{WA} dB
	63	125	250	500	1000	2000	4000	8000	
Talker with normal voice.	56	58	67	69	63	59	55	50	69
Creche Play Area	80	77	75	76	75	71	65	55	79

12.5.9.3 Operational Traffic

Operational phase traffic volumes have been provided by Roughan & O'Donovan Consulting Engineers for use in this chapter. Table 12.23 below outline the operational traffic volumes for the base year “Do-Nothing” and “Do-Something” scenarios for the years 2024, 2028 and 2043.

Table 12.23: AADT Figures per Link (Operational Phase)

Road Link Number	Road Link Name	Base Year AADT/% HGV	Do-Nothing		Do-Something	
			Opening Year 2028	Design Year 2043	Opening Year 2028	Design Year 2043
			AADT/%HGV	AADT/%HGV	AADT/%HGV	AADT/%HGV
1	Griffin Rath Manor	1353 2%	1409 2%	1461 2%	1648 2%	1702 2%
2	R405	6698 3%	6934 3%	7149 3%	9128 2%	9344 2%
3	Dunboyne Road	8418 4%	8797 4%	9140 4%	9284 3%	9627 3%
4	R148	9458 3%	9885 3%	10270 3%	11839 3%	12104 3%

12.5.9.4 Operational Phase Traffic Predictions

Based on the figures outlined above in Section 12.5.9.3 the operational phase of the development is expected to contribute minimal additional traffic volume. In both the “Do-Nothing” and “Do-Something” scenarios, the increase in traffic related noise levels over baseline figures is predicted to be no more than 1dBA at the noise sensitive receptors. Table 12.24 below outlines the total traffic increase from the base year to the operational phase for both the “Do Nothing and Do Something” scenarios.

Table 12.24: Total additional traffic across all AADT links.

Total Traffic Volumes for Each Scenario		Total Additional Traffic Volume Over Base Year
Base 2024	25927	-
DN 2028	27025	1098

Total Traffic Volumes for Each Scenario		Total Additional Traffic Volume Over Base
		Year
DN 2043	28020	2093
DS 2028	31899	5972
DS 2043	32777	6850

Table 12.25 below outlines the magnitude of impact in relation to the increase in traffic numbers during the operational phase of the development. As can be seen in the table below an increase of up to 3dB is considered a minor magnitude of impact.

Table 12.25: Likely effect associated with change in construction traffic noise levels.

Magnitude of Impact	Increase in Traffic Noise Levels (dB)
No Impact	Less than 1.0
Minor	Greater than or equal to 1.0 and less than 3.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Major	Greater than or equal to 5.0

12.5.9.5 Daytime Noise Impact

As the development has the potential to generate noise with different characteristics for both the day and nighttime periods, a model has been undertaken for both the day and nighttime operations of the proposed development. The assessment has been conducted to BS 4142 and EPA NG4 criteria.

Figure 12.5: Screenshot of the noise model showing the proposed development.



The daytime situation assumes the following noise sources:

- 2 car park movements per space during the daytime hours 07:00hrs-23:00hrs.
- Assumed creche operating with outdoor hours for children at 09:00hrs-10:00hrs, 13:00hrs-14:00hrs, and 16:00hrs-17:00hrs, using the spectrum outlined above in Table 12.22.
- Assumed amenity space usage during daytime hours 16:00hrs-23:00hrs using the spectrum outlined above in Table 12.22.
- Assumed 100% on time for residential ASHP using the spectrum outlined above in Table 12.21.

12.5.9.6 BS 4142 Noise Impact Assessment (Daytime 07:00 – 23:00)

The noise impact at the nearest noise sensitive receptors (NSL1-NSL7) has been assessed in accordance with BS4142. Table 12.26 below outlines the assessment at the closest noise sensitive receptor (NSL1), which is the worst-case receptors due to its proximity to the development. All NSL's have been assessed and are predicted to have lower onset noise levels than NSL1.

Table 12.26: Noise Impact for Daytime hours.

Results		Relevant BS 4142 Clause	Commentary
Predicted specific sound level (daytime)	$L_{Aeq(60min)} = 33dB$	7.3.6	As the proposed development is not yet existing, the noise levels have been predicted using SoundPlan modelling software. Worst case specific sound predicted at NSL1.
Residual sound level (daytime)	$L_{Aeq(60min)} = 47dB$	7.3.2	The residual sound level was dominated by road traffic noise on surrounding roads. Background noise from measurement location A3 from was assessed as this is representative for worst case receptor NSL1.
Background sound level (daytime)	$L_{A90(60min)} = 43dB$	8.1.2 8.4	The L_{A90} sound level was measured at the noise sensitive location with the source absent.
Assessment made during the daytime, so the reference time interval is 1 hour		7.2	
Specific sound level as predicted	$L_{Aeq(60min)} = 33dB$	7.3.6	The specific sound has been predicted by calculation alone as the new development is not existing at the time of the survey.
Acoustic feature correction	+0dB	9.2 9.3.2	It is not anticipated that the specific sound will have any impulsive, tonal or intermittent characteristics.
Rating level	$(33 + 0) dB = 33dB$	9.2	
Background sound level	$L_{A90(60min)} = 43dB$	8	
Excess of rating over background sound level	$(33 - 43) dB = -10dB$	11	Assessment indicates that no adverse impact is likely on the noise sensitive locations as the specific sound is 10dB below the background levels

Results		Relevant BS 4142 Clause	Commentary
			and is lower than the residual sound. Context has also been considered.
Uncertainty of the assessment	Not significant	10	The specific sound is a worst-case prediction as the assessment assumes a worst-case operational scenario. The assessed specific sound is the worst-case prediction to NSL1.

12.5.9.7 Consideration of Tonality and Impulsivity

As assessment for tonality and impulsivity was conducted to evaluate noise emissions from the proposed development. Findings indicate that the noise emission are significantly lower than both the background and residual noise levels in the area during the daytime period. Consequently, the emissions are unlikely to produce tonal or impulsive characteristics that will have an impact at the noise sensitive receptors.

12.5.9.8 EPA NG4

NG4 recommends a daytime criterion of (07:00hrs – 19:00hrs) 55dB $L_{A,T}$, the predicted noise emissions from the development are 33 dBA at NSL1, with no tonality or impulsivity, therefore the NG4 criteria is expected to be achieved. Table 12.27 below outlines the predicted noise impact at each noise sensitive location, the project criteria and compliance with the project criteria.

Table 12.27: Predicted noise levels at each noise sensitive location.

Location	Distance to centre of the site (Meters)	EPA NG4 Daytime Criteria	Predicted Noise Level from Proposed Development	Compliance
		$L_{A,T}$ dBA	$L_{eq,T}$ dBA	
NSL1	290	55	33	Compliant
NSL2	600	55	18	Compliant
NSL3	510	55	22	Compliant
NSL4	590	55	16	Compliant
NSL5	490	55	16	Compliant
NSL6	310	55	17	Compliant
NSL7	390	55	24	Compliant

12.5.9.9 Night-time Scenario

As the development has the potential to generate noise with different characteristics for both the day and nighttime, a model has been undertaken for both the day and nighttime operations of the proposed development. The assessment has been conducted to BS 4142 and EPA NG4 criteria.

The night-time situation assumes the following noise sources:

- 1 car park movements per space during the daytime hours 23:00hrs-07:00hrs.
- Assumed creche will not operate during the night-time hours.
- Assumed amenity space usage during night-time hours 23:00hrs-01:00hrs using the spectrum outlined above in Table 12.22.
- Assumed 100% on time for residential ASHP using the spectrum outlined above in Table 12.21.

12.5.9.10 BS 4142 Noise Impact Assessment (Night-time 23:00 – 07:00)

The noise impact at the nearest noise sensitive receptors (NSL1-NSL7) has been assessed in accordance with BS4142. Table 12.28 below outlines the assessment at the closest noise sensitive receptor (NSL1), which is the worst-case receptors due to its proximity to the development. All NSL's have been assessed and are predicted to have lower onset noise levels than NSL1.

Table 12.28: Noise Impact for Night-time hours.

Results		Relevant BS 4142 Clause	Commentary
Predicted specific sound level (nighttime)	$L_{Aeq(15min)} = 32dB$	7.3.6	As the proposed development is not yet existing, the noise levels have been predicted using SoundPlan modelling software. Worst case specific sound predicted at NSL1.
Residual sound level (nighttime)	$L_{Aeq(8,hour)} = 45dB$	7.3.2	The residual sound level was dominated by road traffic noise on surrounding roads. Background noise from measurement location L1 from was assessed as this is representative for worst case receptor NSL1.
Background sound level (nighttime)	$L_{A90(8,hour)} = 39dB$	8.1.2 8.4	The L_{A90} sound level was measured at the noise sensitive location with the source absent.
Assessment made during the nighttime, so the reference time interval is 15 min		7.2	

Results		Relevant BS 4142 Clause	Commentary
Specific sound level as predicted	$L_{Aeq(15min)} = 32\text{dB}$	7.3.6	The specific sound has been predicted by calculation alone as the new development is not existing at the time of the survey.
Acoustic feature correction	+0dB	9.2 9.3.2	It is not anticipated that the specific sound will have any impulsive, tonal or intermittent characteristics.
Rating level	$(32 + 0) \text{ dB} = 32\text{dB}$	9.2	
Background sound level	$L_{A90(8, \text{hour})} = 39\text{dB}$	8	
Excess of rating over background sound level	$(32 - 39) \text{ dB} = -7\text{dB}$	11	Assessment indicates that no adverse impact is likely on the noise sensitive locations as the specific sound is 7dB below the background levels and is lower than the residual sound. Context has also been considered.
Uncertainty of the assessment	Not significant	10	The specific sound is a worst-case prediction as the assessment assumes a worst-case operational scenario. The assessed specific sound is the worst-case prediction to NSL1.

12.5.9.11 Consideration of Tonality and Impulsivity

As assessment for tonality and impulsivity was conducted to evaluate noise emissions from the proposed development. Findings indicate that the noise emission are significantly lower than both the background and residual noise levels in the area during the night-time period. Consequently, the emissions are unlikely to produce tonal or impulsive characteristics that will have an impact at the noise sensitive receptors.

12.5.9.12 EPA NG4

NG4 recommends a nighttime criterion of (23:00hrs – 07:00hrs) 45dB $L_{Aeq,T}$, the predicted noise emissions from the development are 32 dBA at NSL1, with no tonality or impulsivity, therefore the NG4 criteria is expected to be achieved. Table 12.29 below outlines the predicted noise impact at each noise sensitive location, the project criteria and compliance with the project criteria.

Table 12.29: Predicted noise levels at each noise sensitive location.

Location	Distance to centre of the site (Meters)	EPA NG4 Nighttime Criteria	Predicted Noise Level from Proposed Development	Compliance
		$L_{eq,T}$ dBA	$L_{eq,T}$ dBA	
NSL1	290	45	32	Compliant
NSL2	600	45	17	Compliant
NSL3	510	45	22	Compliant
NSL4	590	45	15	Compliant
NSL5	490	45	14	Compliant
NSL6	310	45	16	Compliant
NSL7	390	45	24	Compliant

12.5.9.13 Operational Vibration Predictions

There are no sources of vibration associated with the operational phase of the development.

12.5.10 Inward Noise Impact

12.5.10.1 ProPG Stage 1 – Initial Risk Assessment

The measured noise levels on the site and future noise levels have been predicted for road traffic noise to assess the probability of an adverse impact.

Table 12.30: ProPG Stage 1 Risk Assessment of Existing Noise Levels below identifies the Noise Risk Categorisation of the site based on the predicted free field façade noise levels. The site has been categorised as medium risk in accordance with the ProPg risk assessment. Considering this risk categorisation of the development mitigation measures will not be required to mitigate the noise risk in following ProPG guidance and good acoustic design process.

It should be noted that the ProPG 2017 states the following with regard to how the initial site noise risk is to be used:

“2.12 It is important that the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker. The recommended approach is intended to give the developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced. Thus, a site considered to be high risk will be recognised as presenting more acoustic challenges than a site considered as low risk. A site considered as negligible risk is likely to be acceptable from a noise perspective and need not normally be delayed on noise

grounds. A potentially problematical site will be flagged at the earliest possible stage, with an increasing risk indicating the increasing importance of good acoustic design.”

Table 12.30: ProPG Stage 1 Risk Assessment of Existing Noise Levels

Noise Risk Assessment		Risk Assessment Rating	
Indicative Daytime Noise Levels	Indicative Night-time Noise Levels	Daytime Noise Levels	Night-time Noise Levels
$L_{Aeq,16hour}$	$L_{Aeq,8hour}$		
		High Risk	High Risk
		N/A	N/A
		Medium Risk	Medium Risk
		The boundary of the site facing the proposed ring road are within the medium risk contour for daytime noise. Good acoustic design should be observed.	The boundary of the site facing the proposed ring road is within the medium risk contour for night-time noise levels. Good acoustic design should be observed.
		Low Risk	Low Risk
		The majority of the site is within the low risk contour for daytime noise levels.	The majority of the site is within the low risk contour for nighttime noise levels.
		Negligible Risk	Negligible Risk
		N/A	N/A

12.5.11 ProPG Stage 2- Full Assessment

This section outlines the full acoustic design assessment in line with ProPG guidance.

12.5.11.1 Element 1: Good Acoustic Design Process

ProPg States the following in relation to Good Acoustic Design Process:

“A good acoustic design process takes a multi-faceted and integrated approach to achieve optimal acoustic conditions, both internally (inside noise-sensitive parts of the building(s)) and externally (in spaces

to be used for amenity purposes).”

“Good acoustic design should avoid “unreasonable” acoustic conditions and prevent “unacceptable” acoustic conditions (these terms are defined in Element 2). Good acoustic design does not mean overdesign or gold plating of all new development but seeking to deliver the optimum acoustic outcome for a particular site”

The following considerations are recommended by ProPG:

- *“Check the feasibility of relocating, or reducing noise levels from relevant sources.*
- *Consider options for planning the site or building layout.*
- *Consider the orientation of proposed building(s).*
- *Select construction types and methods for meeting building performance requirements.*
- *Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc.*
- *Assess the viability of alternative solutions.*
- *Assess external amenity area noise.”*

12.5.11.2 Discussion of Good Acoustic Design

Mitigation of Sources

The development is located close to the road and rail noise sources which are not on or part of the development therefore it is not possible to reduce or relocate the relevant noise sources.

Site Layout and Orientation

The east of the site is the section that is most exposed to traffic noise as a new proposed ring road intersects the proposed site. There is a rail line to the north of the site, which is separated by green fields and sporadic residential developments. The east of the site is bounded by residential developments, there are residential and commercial units to the south, and there are green fields and sporadic residential developments to the west.

Construction Methods

Section 12.5.12.1 considers the construction methods required to meet the building performance control measures. The construction measures are in general robust, providing standard external wall and façade details to meet thermal, fire and weathertightness requirements will in general provide adequate performance to achieve good levels of sound insulation.

Impact of Noise Control Measures

The effects for noise control measures on other building elements including ventilation are considered in Section 12.5.12.1 It is generally impractical to provide ventilation via openable windows in urban/built up areas. An open window will provide 10-15dB of attenuation which in built-up urban and suburban areas is not practical. ProPG makes reference to specific cases in suburban areas where the development is beside a transport link, in this case the development is close to the Dublin-Sligo railway line. In general, the good acoustic design process in these areas is to provide ventilation via attenuated natural vents or

mechanical ventilation. This allows the occupants to have adequate ventilation with adequate noise levels.

12.5.11.3 External Amenity

ProPG states the following with regard to external amenity spaces:

“The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed, and noise levels should ideally not be above the range 50 – 55 dB LAeq,16hr.”

The external amenity source noise levels are considered in section 12.5.13.

12.5.12 Element 2 – Assessment of Internal Noise Levels

Assessment of the predicted internal noise levels has been undertaken with respect to the noise levels of the MERR with noise levels referenced from the following report MERR-ROD-LSI-SW_AE--RP-CH-40001.

12.5.12.1 Building Envelope Specification

This section outlines the building envelope requirements based on the measurements outlined in Section 12.3. Facade, wall, glazing, roof and ventilation specifications have been determined to achieve the internal noise level criteria for the development. The specification has been determined in accordance with EN ISO 12354-3: 2017 based on the predicted façade day and night noise levels, the room and facade dimensions from the drawings provided.

The building envelope specification should be confirmed by the acoustic consultant at design stage once the internal layouts and building envelope design development has been completed. Any changes to the assumed ventilation strategy and glazing requirement should be considered as part of the review and it should be based on the internal noise levels cited in this report.

12.5.12.2 Glazed Elements and Ventilation

The glazed elements and ventilation openings are typically the acoustically weakest elements of any façade. The required sound insulation performance of façade glazed elements and ventilation openings is outlined in Table 12.31 below.

It is required that the glazing, frame and seals as a whole achieve the performance when the window is in the closed position. The performance requirements outlined in Table 12.31 below are considered to provide adequate sound insulation to achieve the relevant day and night internal design goals respectively. The values that were used for the future noise predictions were obtained from noise impact assessment provided as part of the Environmental Report at planning- MERR-ROD-LSI-SW_AE--RP-CH-40001.

Table 12.31: ProPG Sound Insulation Performance Requirements for Glazed Elements and Ventilation.

Glazed Elements (Frame & Glazing) Sound Insulation Requirements (Indicative requirements equal or approved)								
Façade	Octave Band Frequency Requirements ¹ R dB						Glazing Acoustic Performance dB R _w	Façade Ventilation Requirement ²
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz		
RED	28	28	29	38	38	34	35dB R _w	38dB D _{n,e,w} ⁽¹⁾ Natural Ventilation or Mechanical Ventilation
GREEN	Standard Double Glazing ³							Standard passive ventilation

- (3) Natural ventilation assumed throughout, the performance cited for the ventilator is in the open position. Should this change to mechanical ventilation the above specification may be reduced. An acoustic consultant should be engaged to assess the level of reduction appropriate to maintain the internal noise level criteria.
- (4) The calculation assumes a maximum of 1 ventilation opening per bedroom at the above specification.
- (5) Standard double glazing assumes a construction of two panes of 3mm glass with a 10mm cavity achieving a minimum 29dB R_w, equal or approved.

It is important to note that the requirements outlined above are minimum requirements for the glazed element as a whole. The octave band values are indicative and specific to the assessed glazing type, equal or approved to meet the minimum project requirements is acceptable.

An Acoustic Consultant should be engaged to at design development stage once the final details are known to assess the final glazing and façade requirements for the development.

It is recommended that the façade supplier provide laboratory tests confirming the airborne sound insulation performance in the absence of suitable laboratory data a composite sound reduction index calculation undertaken by a suitably qualified acoustic consultant can be used to demonstrate compliance.

12.5.12.3 External Wall Construction

The façade wall construction has been assumed to achieve a minimum sound insulation performance of 56dB R_w. Typical façade construction such as concrete, blockwork, timber frame and brick offer high levels of sound insulation and will meet this requirement.

12.5.12.4 Roof Construction

The roof construction has been assumed to achieve a minimum sound insulation performance of 50dB R_w . Any skylights and glazing in the roof system to corridor or communal areas should be of standard double-glazed construction to meet a performance of minimum 29 dB R_w . If there are any skylights to habitable bedrooms Wave Dynamics should be informed to provide specific guidance in each case.

12.5.12.5 Glazing Markups

Figure 12.6, Figure 12.7 and Figure 12.8 below outline the locations of the required glazing specifications across the site. The specification outlined in this section should be confirmed by the acoustic consultant at design stage.

Figure 12.6: Glazing markups (Site Plan part 1)

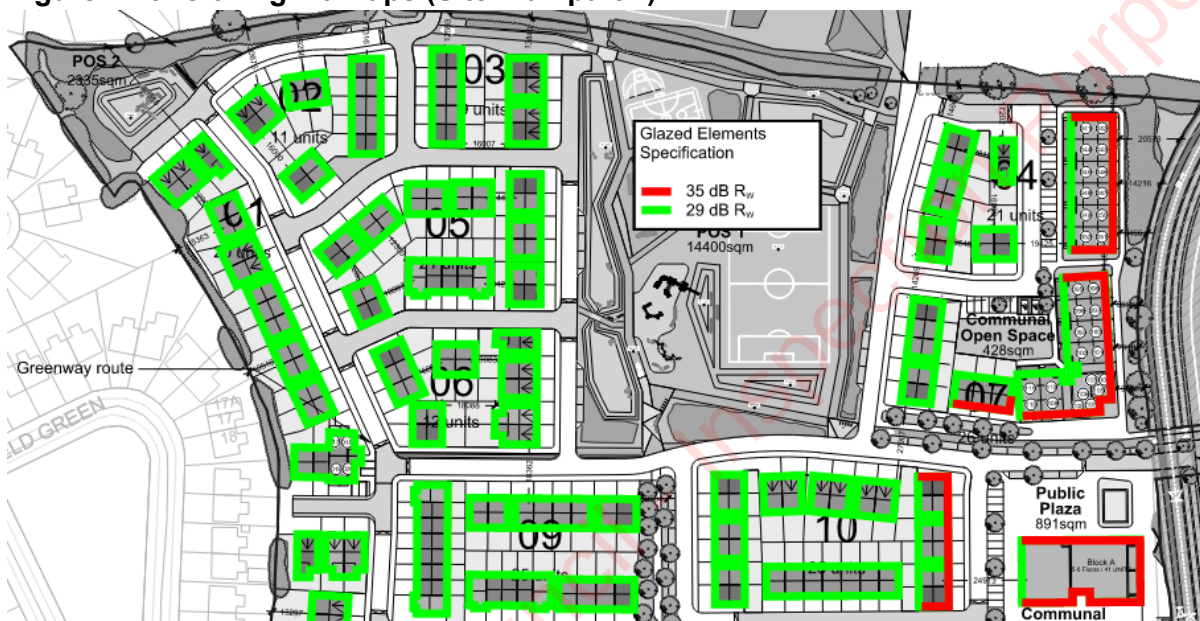
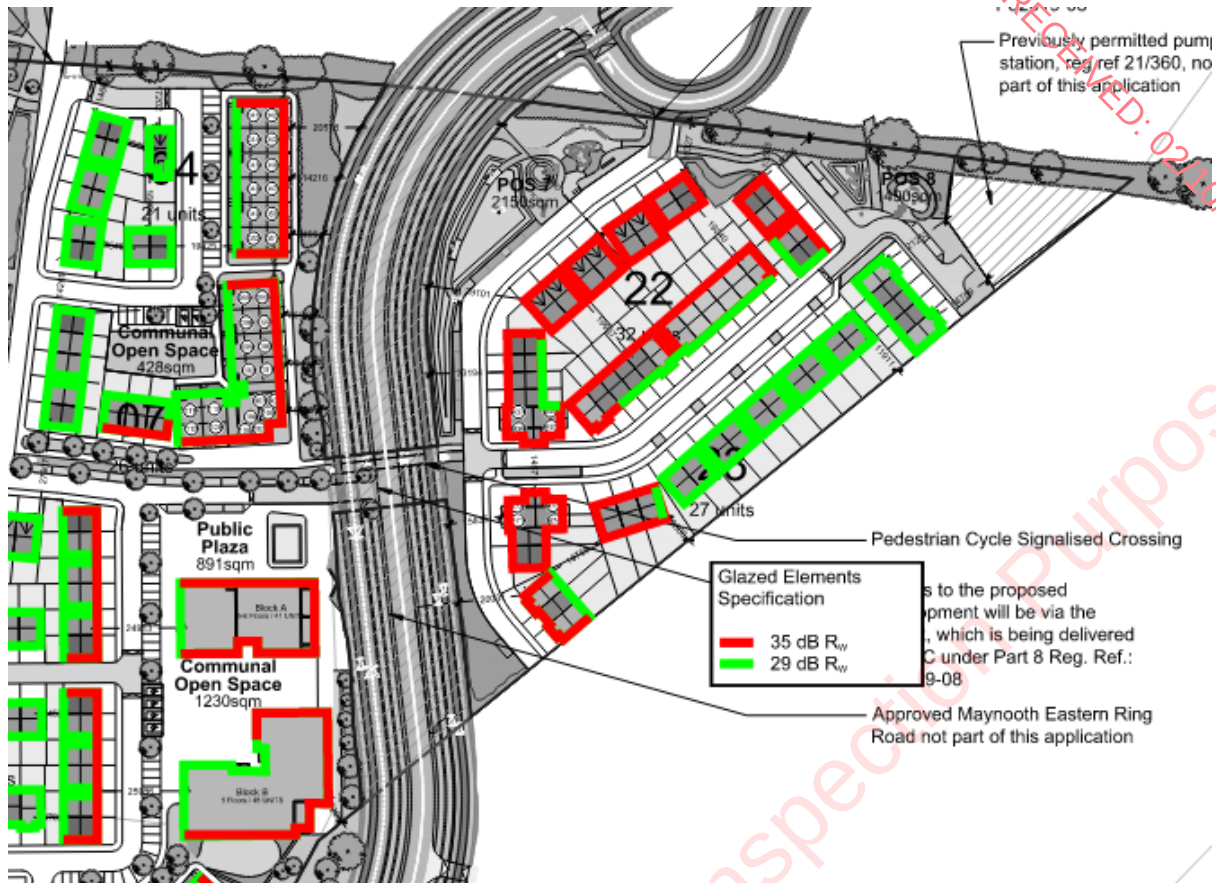


Figure 12.7: Glazing markups (Site Plan part 2)



Figure 12.8: Glazing markups (Site Plan part 3)


12.5.13 Element 3- External Amenity Spaces

The external amenity spaces on the development include external amenity in the form of private gardens for the houses, balconies for the duplexes and a public open spaces at ground level and playground. All external amenity spaces have been assessed based on the information provided in the planning stage noise impact assessment for the MERR. All private house gardens are predicted to comply with the project criteria, the balconies on the duplex units to the southeast of the sites eastern balconies are predicted to exceed the desired noise levels for external amenity spaces, however, the duplex units have an alternative private balconies on the northwest façade. This extra space, combined with all public open spaces and communal open spaces, which are predicted to comply, provide ample amenity space for residents.

Figure 12.9 and Figure 12.10 below highlight the proposed external amenity spaces across the development.

Figure 12.9: Amenity Space across the site at ground level (Part 1) (Reference: MRP-XX-ZZ-DR-JFA-AR-PP1000)

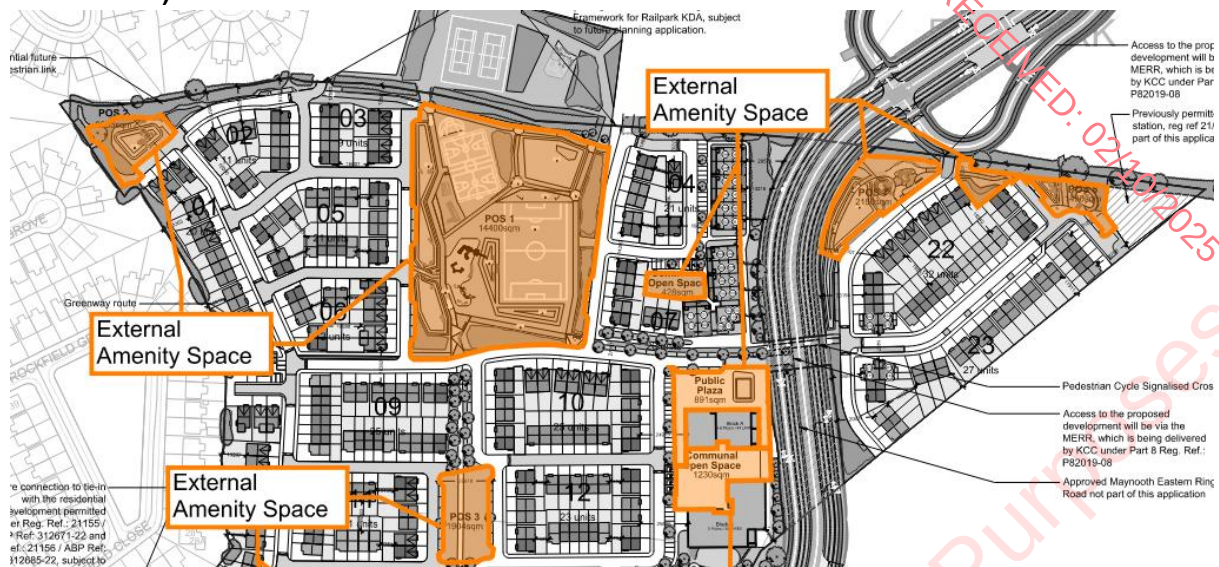
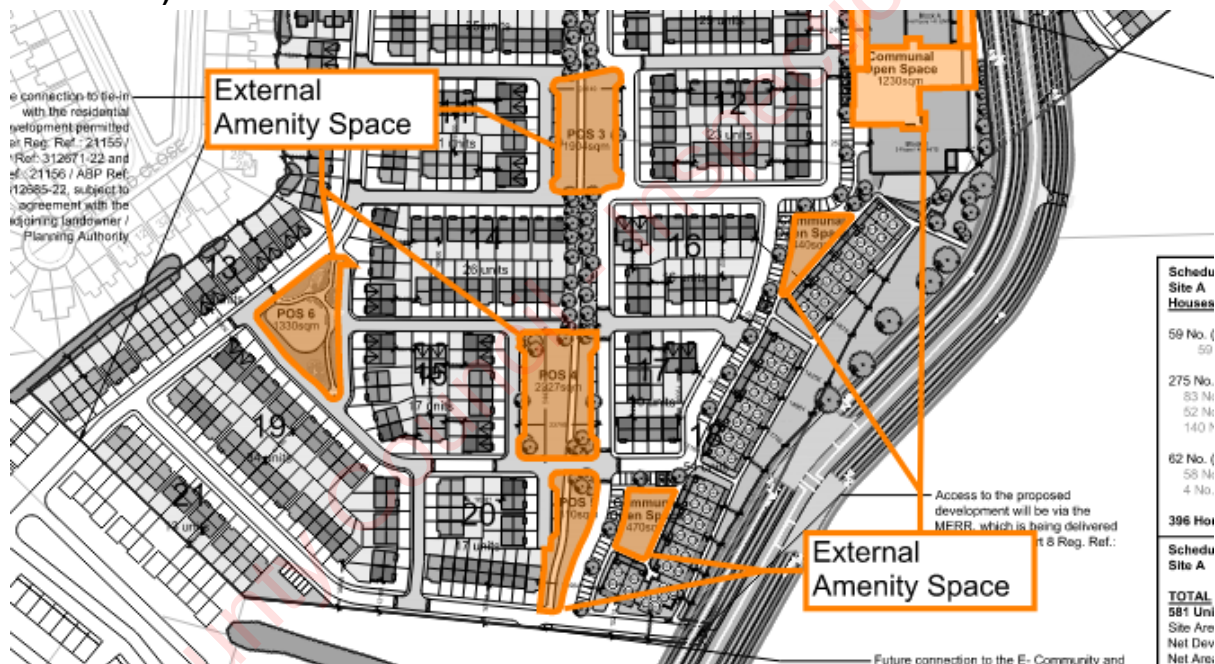


Figure 12.10: Amenity Space across the site at ground level (Part 2) (Reference: MRP-XX-ZZ-DR-JFA-AR-PP1000)



12.5.14 Element 4- Assessment of Other Relevant Issues

This section of the acoustic design report considered the other relevant issues. Element 4 considers other issues which may remain relevant to the assessment, these issues are as follows:

- 4(i) compliance with relevant national and local policy.
- 4(ii) magnitude and extent of compliance with ProPG .
- 4(iii) likely occupants of the development.
- 4(iv) acoustic design v unintended adverse consequences and;
- 4(v) acoustic design v wider planning objectives.

12.5.14.1 Compliance with Relevant National and Local Policy

There are no specific noise guidance or policy documents for residential developments. The Dublin Agglomeration Noise Action Plan refers to the ProPG as the relevant document for assessment of the noise impact on new residential developments as followed in this acoustic design statement.

12.5.14.2 Magnitude and Extent of Compliance with ProPG

This report demonstrates that all dwellings will meet the specified internal noise level requirements provided the guidance in this report is followed. External amenity spaces have been provided in line with the guidance set out in ProPG. Based on this the development is in general compliance with the ProPG requirements.

12.5.14.3 Likely Occupants of The Development

Additional needs of the future occupants are not known at this stage however the needs of all potential occupants have been considered with the assessment of adequate internal noise levels and provision of adequate external amenity spaces to meet the needs of potential occupants.

12.5.14.4 Acoustic Design v Unintended Adverse Consequences

The design has considered the impact of adverse consequences, mitigation has been provided by specification of the sound insulation and ventilation requirements.

12.5.14.5 Acoustic Design v Wider Planning Objective

Where possible the wider planning objectives have been considered including the need for residential housing with good transport links. It is assumed that the wider planning objectives have been adhered to by following the ProPG guidance.

12.5.15 Stage 2 Assessment Conclusion

The stage 2 assessment considers all four (4) elements, the principals of good acoustic design have been followed.

The element 2 assessment has considered the measures required to provide an adequate acoustic environment with appropriate noise levels for internal spaces. The sound insulation and ventilation requirements have been specified based on the predicted façade noise levels.

The element 3 assessment of external amenity spaces has considered the noise impact on the development and the external amenity spaces. The appropriate provision of external amenity space has been provided through the use of gardens, balconies and the ground level communal amenity spaces in line with the ProPG guidance.

Other relevant issues have been considered including, local policy, unintended consequences and the wider planning objectives.

12.6 POTENTIAL CUMULATIVE EFFECTS

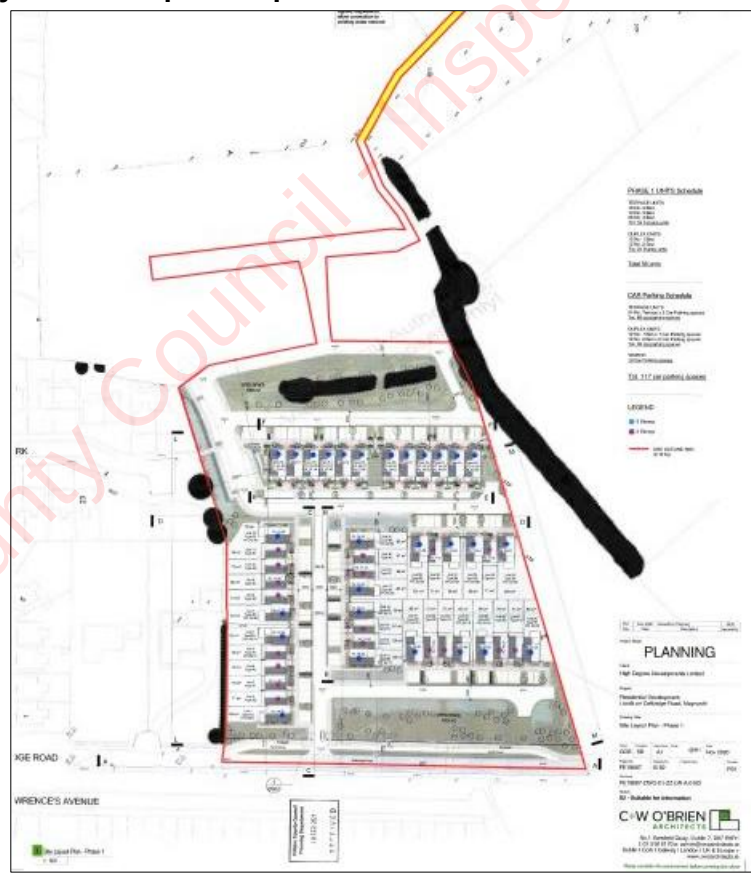
This section outlines the cumulative noise and vibration impact with the inclusion of existing or approved planning projects in the surrounding area. A list of existing or approved developments has been provided for use in this report.

REG REF. 21155 / ABP REF. 312671-22

An Bord Pleanála granted permission to High Degree Developments Limited in an Order dated the 13th of February 2024, subject to 25 no. conditions, for a Phase 1 residential development, consisting of c. 58 number dwellings, at lands adjoining an existing residential development (Rockfield Park), Railpark, Celbridge Road, Maynooth, Co. Kildare. This forms Phase 1 of a residential masterplan for some 105 no. units in total on a wider c. 3.26 ha landholding under the Applicant's control.

The proposed development provides for a future vehicular connection to tie-in with the residential development permitted under Reg. Ref.: 21155 / ABP Ref: 312671-22 (Phase 1) to the southwest of the subject site, as provided for under that permission, and subject to agreement with the adjoining landowner / Planning Authority. The layout allows for connection to the north via a road terminating at the boundary which allows for a future connection to the subject site. We note that the permitted residential development will be advanced prior to the development being implemented on the subject site and will provide for future connections into these lands.

Figure 12.11: Site Layout Masterplan Map



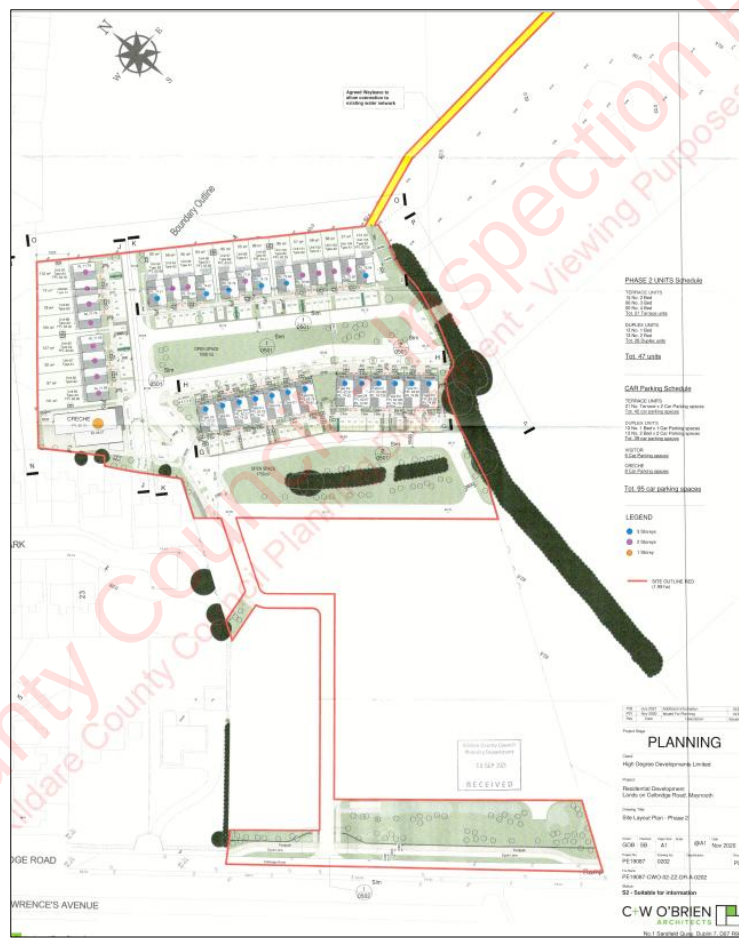
Extract from Site Layout (combined 2 phases, includes PRR 21156)

REG. REF.: 21156 / ABP REF.: 312685-22

An Bord Pleanála granted permission to High Degree Developments Limited in an Order dated the 13th of February 2024, subject to 25 no. conditions, for Phase 2 of a residential development, consisting of c. 47 no. dwellings, at lands adjoining an existing residential development (Rockfield Park), Railpark, Celbridge Road, Maynooth, Co. Kildare. This forms Phase 2 of a residential masterplan for some 105 no. units in total on a wider c. 3.26 ha landholding under the Applicant's control.

The development provides for a future vehicular connection to tie-in with the residential development permitted under Reg. Ref.: 21155 / ABP Ref: 312671-22 (Phase 1) and Reg. Ref.: 21156 / ABP Ref: 312685-22 (Phase 2) to the southwest of the subject site, as provided for under that permission, and subject to agreement with the adjoining landowner / Planning Authority. The layout allows for connection to the north via a road terminating at the boundary which allows for a future connection to the subject site. We note that the permitted residential development will be advanced prior to the development being implemented on the subject site and will provide for future connections into these lands.

Figure 12.12: Proposed Site Layout Plan



The Board in granting permission for the above developments, acknowledged that the LAP had expired, but in their reasons and considerations to grant had regard to the designation of Maynooth as a 'key town' at the top of the settlement hierarchy of Co. Kildare, the housing targets for the town to 2028 as set out in the CDP 2023-2029, and inter alia the pattern of development in the area.

Based on the location of the development in relation to the proposed development assessed in this report, there may be potential crossover in construction phases of both developments. This is likely as the construction of this development appears to be underway at the time of writing, especially given this development is phased construction. If there is crossover between construction periods, cumulative noise and vibration impacts may be present at surrounding noise sensitive receptors. By implementing the measures outlined in Section 12.9 of this chapter the negative noise and vibration impact of the proposed development it will be limited. Additionally, construction phases are temporary in nature and lasting effects will not be present.

There is likely not to be any negative noise or vibration impact from both developments operating simultaneously as both developments are residential dwellings, therefore there will be no excessive noise or vibration noise sources to generate excessive noise at existing noise sensitive receptors.

REG. REF.: 211108

Kildare County Council issued a final grant on 3rd October 2022 for a year 10 permission for the demolition of a habitable house and the construction of residential development at Parklands Grove, Railpark, Maynooth, Co. Kildare, W23 V5D4. The site is c. 300m north of the subject application site.

The application as submitted included 40 No. houses and 36 No. apartments, 1 No. vehicular link with the approved Maynooth Eastern Ring Road and all associated and ancillary site development works.

The application was subject to further information and a response was submitted on 29th April 2022 and was deemed significant.

Condition 5 of the permission outlines that 76 no. residential units are permitted on site.

Figure 12.13: Site Layout Plan (as revised at FI stage)



Based on the distance from site centre to site centre (approximately 600m) there is little cumulative noise and vibration impact during the operational phase of both developments due to the attenuation of noise over distance.

There is potential noise and vibration impact during the construction phase of the developments as there are multiple shared noise sensitive receptors in the area surrounding both developments. Implementation of mitigation measures outlined in Section 12.9 will reduce the onset construction noise and vibration potential impacts and thus lead to less of an impact on sensitive receptors. Additionally, construction phases are temporary in nature leading to no lasting noise and vibration effects on surrounding sensitive receptors.

REG. REF.: 2461139

An application was submitted to Kildare County Council on 30th October 2024 for the following development on lands at Doctor's Lane, Maynooth, Co. Kildare (c. 850m northwest of the site):

The construction of 18 no. residential units comprising of 1 no. 2 bed 3 storey terraced house, 10 no. 2 bed with study 3 storey terraced houses, and 7 no. 3 bed 3 storey terraced houses, all provided with private gardens and balconies/terraces; bin and bicycle stores; car parking; new vehicular access on Doctor's Lane; landscaping; boundary treatments including works to existing boundary treatments; public lighting; and all associated site infrastructure and engineering works necessary to facilitate the development including the decommissioning and removal of the existing soakaway system serving No. 8 Main Street and replacement with a new SuDS system.

A Natura Impact Statement (NIS) has been prepared and is submitted to the planning authority with the application.

The application was subject to a request for further information subject to 3 items (design/layout, transportation and comments raised by third parties). The development is currently subject to a third party appeal.

Figure 12.14: Proposed Site Layout Plan.



Based on the distance between this development and the proposed development in this chapter (approx. 1km site centre to site centre), there is likely to be no negative cumulative noise and vibration effects during both the construction and operational phase.

REG. REF.: 2460774

Kildare County Council issued a final grant on 6th January 2025, subject to 19 no. conditions, for amendments to the permitted residential development under Reg. Ref.: 23/494 on lands adjoining and to the rear of St Mary's Church at Mill Street, Maynooth, Co. Kildare. The site is c. 1km to the north west of the application site.

Condition 2 outlines that this permission authorises the following amendments to permission REF 23/494:

- (a) *Reconfiguration of the basement layout with a reduction in car parking provision within the scheme from 74 no. car parking spaces to 69 no. car parking spaces.*
- (b) *The redesign of apartment blocks A, B1, B2 and C within the scheme with each block incorporating the following proposals only:*
 - *Block A: A four-storey building comprising 10 no. 2bed apartments.*
 - *Block B1: A five-storey building comprising 18 no. 2bed apartments.*
 - *Block B2: A six-storey building comprising 25 no. 1bed apartments and 35no. 2bed apartments.*
 - *Block C: A part 4 storey and part 5 storey building comprising 4no. 1bed apartments, 14no. 2bed apartments and 9no. 3bed apartments. Block C will be raised on stilts with a flood storage area provided at ground level beneath this block.*
- (c) *The amendment of overall unit mix within the scheme which incorporated 27no. 1bed apartments, 77no. 2bed apartments and 11no. 3bed apartments under permission 23/494 (a total of 115 apartments) to provide an amended unit mix consisting of 29no. 1 bed apartments, 77no. 2bed apartments and 9no. 3bed apartments (total of 115 apartments).*
- (d) *Associated amendments to building designs, facades, floor plans, layouts and internal configurations.*
- (e) *Amendments to the creche (providing for 29 child spaces as per drawing PL16-164-024 dated 20/04/2023) and restaurant layouts in Block A.*
- (f) *The omission of the office unit from Block A.*
- (g) *Amendments to communal space areas and associated parking area/turning area at podium level within the courtyard to include for provision of play areas.*
- (h) *The provision of associated site works and attenuation system along with a foul pump station and foul, storm and public water networks for connection to the existing foul, storm and public water networks.*
- (i) *Provision of an ESB substation adjacent to Block A.*
- (j) *Site excavation works to facilitate the proposed development to include levelling, excavation and general site preparation works.*
- (k) *The provision of an amended basement layout which is to be positioned beneath blocks B1, B2.*

Reason: In the interests of clarity and orderly development.

A Natural Impact Statement has been prepared and accompanies this application.

Figure 12.15: Proposed Site Layout Plan



Based on the distance between both developments (approx. 1.5km site centre to site centre) there will be no negative cumulative noise and vibration impact during the construction or operational phase of the development.

Maynooth Eastern Ring Road (MERR)

Reg. Ref.: P82019-08 - Maynooth Eastern Ring Road

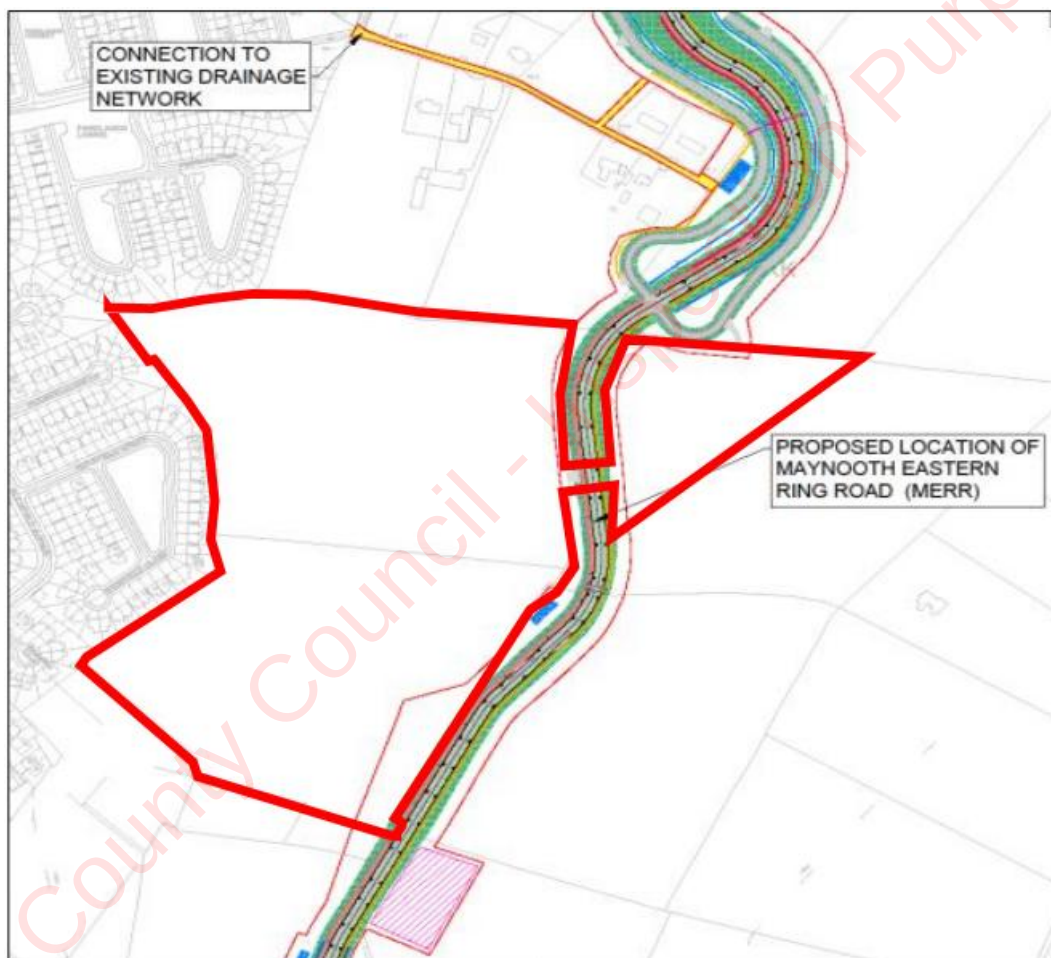
A Part 8 application for the Maynooth Eastern Ring Road (MERR), which provides for the construction of a 7m carriageway of 1.55km in length, bridge across the Royal Canal and railway line, provision of pedestrian and cyclist facilities along the length of the development, including a link to the towpath of the canal, new junctions at the R148 Dublin Road and Dunboyne Road (R157) and the Celbridge Road (R405) and Griffin Rath Road (L80149) and all associated works, was approved by Kildare County Council on the 29th of July 2019.

The Planning Report accompanying the Part 8 application described the 'Maynooth Eastern Ring Road' as comprising of 'a new single carriageway relief road to the east of Maynooth town, to facilitate the connection of the R405 Celbridge Road and the R148 Leixlip Road. The proposed new road will include a 41m long single span bridge crossing of the Royal Canal and the Dublin to Sligo railway line. At the northern extent of the development it will connect to the existing junction of the R148 Leixlip Road and the R157 Dunboyne Road. At the southern end of the development it will connect to the existing junction of the R405 Celbridge Road and the Griffin Rath Road. Pedestrian and cyclist facilities will be provided on each side of the new relief road, in both north and south directions, and an access to the Royal Canal towpath will be provided from the northern end of the proposed road for pedestrians and cyclists. The relief road will be approx. 1.55 km long, while approximately 800m of existing roads will be upgraded to accommodate the proposed adjustments to the existing junctions. Access to lands, both agricultural and those zoned as 'New Residential' will be provided to enable future development'.

The route of this link road is orientated through the subject lands and will provide access to the site and has been designed to facilitate residential development on the lands as illustrated in the Railpark KDA in the new Maynooth and Environs Joint LAP. A relevant extract of the proposed ring road is shown in Figure 12.16, with the approximate extent of the subject lands' boundary outlined in red.

The CPO process associated with the MERR is currently being progressed by KCC following approval by An Bord Pleanála on the 26th day of January 2024, and a Contractor was appointed in August and construction completed within 18 months, i.e. September 2026. In advance of the construction of the MERR, direct access from the subject lands to a public road is not possible. However, the recent permissions on the Railpark lands to the south, for The Grange residential development, which is now under construction, provide the potential for vehicular access through these adjacent lands to the Celbridge Road / R405.

Figure 12.16: Part 8 Layout as lodged



Source: [Maynooth Eastern Ring Road Pl. Ref P82019-08 - Kildare County Council \(kildarecoco.ie\)](#)

Note: Red Line Indicative – extract only of part of Part 8 approved road)

MAYNOOTH EASTERN RING ROAD

The assessment presented in this report is based on measured ambient noise levels within the surrounding area, evaluating both operational and construction-phase noise and vibration impacts. Given the proposed construction schedule, there will be an overlap between the construction phases of the

Maynooth Eastern Ring Road (MERR) and the development. A noise impact assessment has been undertaken as part of the planning application.

The construction noise limits for the MERR will be higher than those for the development, as the road constitutes an infrastructure project. The noise limits for the MERR have been set at 70 dB(A) Leq, as per the Maynooth Eastern Ring Road Part VIII Planning Report (2019). In contrast, the limits for the proposed development are set at 65 dB(A) Leq, and with the implementation of mitigation measures, it is predicted that the project will comply with the prescribed noise criteria. Due to the logarithmic nature of noise propagation and the fact that the development is expected to remain within the lower threshold, no significant cumulative noise impact is anticipated.

Predicting groundborne vibration levels is inherently complex, as they are influenced by several factors, including soil composition, compaction, and the proximity of receptors. However, given the separation distance between the development and the nearest receptors, alongside the mitigation measures outlined in the Maynooth Eastern Ring Road Part VIII Planning Report (2019), no significant cumulative vibration impact is anticipated.

Regarding operational noise, the introduction of the MERR is expected to result in an increase in background noise levels. As the operational noise and vibration assessments in this Environmental Impact Assessment Report (EIAR) are based on existing ambient conditions, the evaluation has been carried out on a worst-case basis, i.e., considering current baseline noise levels. No sources of vibration are associated with the operational phase of the development.

Other Significant Planning Permissions in The Wider Area

Reg. Ref.: 21360

Kildare County Council granted permission on 27th of September 2021 to Irish Water (now Uisce Eireann) for the following development:

“A new wastewater pumping station with an underground emergency storage tank; inlet chamber, wet well chamber, valve and flow chambers; above ground welfare building, control kiosk, fixed lifting gantry, 1 No. odour control unit, security gate and fencing. All associated ancillary and enabling works including hardstanding, landscaping and site drainage. All the above is proposed on a site of approximately 0.1 hectares at lands to the north of Celbridge Road within the townland of Railpark.”

12.6.1.1 Model Assumptions

The following general assumptions were made as part of the assessment:

- Assumed both day and night-time operation (worst case).
- Modelling based on the drawings, layouts and information provided.
- Assumed external amenity sound power data based on male talker (worst case) with normal voice, 1 in 3 talking at one time during the hours of 16:00hrs-01:00hrs. Occupancy per space breakdown in point below.
- Assumed 2 car parking movements per space during daytime hours, and 1 car parking movements per space during night-time hours.
- Assumed the following occupancy for external amenity spaces across the development.

For the predictions a receiver was placed at each NSL to calculate the worst-case noise impact. Where NSLs included a number of houses or noise sensitive locations multiple receivers were used to establish the worst case and most impacted NSL.

12.7 'DO NOTHING' IMPACT

Under the Do-Nothing scenario, the prevailing noise environment at the closest noise and vibration sensitive locations will remain in line with those measured during the baseline study and hence will be of neutral effect in terms of noise and vibration impact

12.8 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

This section outlines the remedial and mitigation measures based on the predicted noise and vibration impacts of the construction phase and operational phase of the proposed development.

12.8.1 Construction Phase

Best practice control measures for noise from construction sites are found within BS 5228 (2009 +A1 2014) part 1. Construction noise impacts are expected to vary during the construction phase of the project, this impact will depend on the distance between the construction activities and noise sensitive receptor. The contractor will ensure that all best practice noise and control methods will be used, to ensure any negative noise impacts at off-site noise sensitive locations are minimised.

N&V CONST 1: Noise at source

Where replacing a noisy item of plant is not viable or practical, consideration should be given to control of noise at the source. This includes modifying the piece of plant or equipment to generate less noise, using dampening to control vibration induced noise or rattling. Example best practice mitigation measures to be considered are as follows:

- All plant and equipment to be switched off when idling.
- The use of white noise reversing alarms.
- Restriction on the dropping and loading of material to less sensitive hours.
- The use of local screening for noisy activities or works with hand tools.
- Not dropping material onto hard surfaces and using rubber mats etc, for the dropping of materials.
- Ensure all plant and equipment is well maintained and cleaned, all lubrication should be in line with manufacturer guidelines

N&V CONST 2: Screening

Screening when used correctly can be an effective method of reducing the construction noise impact on the NSL's. The use of site hoarding and careful selection of areas for noise works, using buildings on the site, site offices and the building being constructed to screen noise from the works.

Local screening of noisy works with the use of temporary acoustic barriers.

N&V CONST 3: Public Engagement

A public liaison officer will be put forward by the contractor to liaise with the local residents on matters relating to noise. Residents should be informed of any noise works scheduled where there is the potential to generate high levels of construction noise or if specialist works etc need to be conducted

out of the working hours. This person should also be the point of contact for all complaints and be responsible for reviewing the noise monitoring results and exceedances.

N&V CONST 4: Noise Site Set Up

- Erect a minimum 2.4m high site hoarding that blocks the line of sight between noise source and receiver.
- Example construction for the site hording would be as follows:
- A 2.4m high and 9mm plywood (4.5 kg/m²). Barrier must be solid and not contain gaps at the bottom or between adjacent panels
- Local screening is required around d hand tools in addition to hoarding.
- An absorptive lining should be considered for screening around hand tools will need to have an absorptive lining to avoid reflections increasing noise at other receivers.
- On this project 7 NSL's have been identified, a noise monitor will be placed on the boundary of the nearest noise sensitive locations closest to the works i.e. NSL1 and NSL6 in this case.

N&V CONST 5: Noise Substructure

- Site hoarding to block line of sight. Local screening around noisy plant and equipment.
- Noise monitoring as above.

N&V CONST 6: Noise Superstructure

- Local screening around saws/hammers. Use external new buildings to screen noise from works.
- Noise monitoring as above.

N&V CONST 7: Noise External Finishes

- Local screening around hand tools.
- Noise monitoring as above.

12.8.2 Operational Phase

N&V OP 1: Noise

The operational phase of the development is not predicted to have a negative noise effect considering the predicted effects are in line with the project criteria. Noise associated with the increase in traffic flows is projected to result in a maximum increase of 1dB(A) from baseline figures in 2024 to the "Do Something 2043" scenario, which is considered negligible in terms of perceptible change. Additionally, noise from external plant and equipment has been assessed to meet the required standards, ensuring that operational effects remain minor and localised. Overall, the operational phase will have minimal residual effects on the surrounding environment during both the daytime and night-time periods.

N&V OP 2: Vibration

Prediction of vibration levels at receptors is complex and dependent on several variables including the excavation method, the nature of the used equipment, the properties of the subsoil, the heterogeneity of the soil deposit, the distance to the receptor and the dynamic characteristic of the adjacent structures. Therefore, limits or threshold criteria as set out in BS5228-2 are applied for buildings and humans. As noted above, specific manufacturer limits will apply to sensitive equipment.

BS5228-2 provides some historic data on vibration levels measured on sites from different types of piling equipment under specific conditions e.g. soil type, however there is no data for other types of equipment.

Taking account of the distances to the works and notwithstanding ground conditions present, it is not anticipated that the vibration criteria outlined above will be exceeded. However, precautionary vibration monitoring at the boundary with the nearest sensitive receptors will be undertaken during construction (for vibration generating works).

12.9 RESIDUAL EFFECTS OF THE PROPOSED DEVELOPMENT

This section assesses potential significant environmental impacts which remain after mitigation measures are implemented.

12.9.1 Construction Phase

12.9.1.1 Noise

As the construction phase is temporary, there will be no long-term/permanent noise impacts on the surrounding area from construction noise. Section 12.8 above outlines mitigation measures which if used in full will reduce the construction noise impact on the surrounding sensitive receptors.

12.9.1.2 Vibration

As the construction phase is temporary, there will be no long term/permanent vibration impacts on the surrounding area from construction activities. Section 12.8 above outlines mitigation measures which if used in full will reduce the construction vibration impact on the surrounding sensitive receptors.

12.9.2 Operational Phase

12.9.2.1 Noise

Operational noise sources include plant and equipment, creche play areas, playgrounds and other external amenity spaces, along with car parking movements and traffic movements in and out of the site. Based on the noise impact assessment it is not likely that these sources will have a negative noise impact on the surrounding area.

12.9.2.2 Vibration

Based on the type, and assumed usage of the development, it is not expected that there will be any operational vibration impacts on surrounding noise sensitive receptors.

12.9.3 Summary of Post-mitigation Effects

The following Table 12.32 summarises the identified likely significant residual effects during the construction phase of the proposed development following the application of mitigation measures.

Table 12.32 Summary of Construction Phase Effects Post Mitigation

Quality	Significance	Duration	Type
Neutral	Slight	Short-Term	Noise
Neutral	Imperceptible	Short-Term	Vibration

The following Table 12.33 summarises the identified likely residual significant effects during the operational phase of the proposed development post mitigation.

Table 12.33 Summary of Operational Phase Effects Post Mitigation

Quality	Significance	Duration	Type
Neutral	Imperceptible	Long-Term	Noise
Neutral	Imperceptible	Long-Term	Vibration

12.9.4 Cumulative Residual Effects

The cumulative residual effects of the development, considering both the construction and operational phases, are primarily related to noise. During the operational phase, a marginal increase in traffic associated with the development is expected to result in a slight rise in ambient noise levels of up to 1dBA at certain NSL's. Additionally, noise emissions from external plant and equipment located at ground level at each dwelling contribute to the residual effects. These impacts are anticipated to be negligible, localised, and compliant with relevant criteria, ensuring that they remain within acceptable levels. No other significant residual effects are expected following the implementation of appropriate mitigation measures during the construction phase. Table 12.34 below outlines the magnitude of effects due to the increase in traffic levels with the operation of the development.

Table 12.34: Likely effect associated with change in construction traffic noise levels.

Magnitude of Impact	Increase in Traffic Noise Levels (dB)
No Impact	Less than 1.0
Minor	Greater than or equal to 1.0 and less than 3.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Major	Greater than or equal to 5.0

12.10 MONITORING

Noise and vibration monitoring should be considered during the construction phase of the development. Particularly during the substructure stage of construction when piling operations are likely to occur. There are a multitude of noise sensitive receptors surrounding the development lands, NSL's 1 and 6 are the most suitable locations for noise and vibration monitors to be erected.

12.10.1 Risk of Major Accidents or Disasters

There are no predicted adverse effects of the project on the environment in terms of acoustics. As outlined above in Section 12.5 the construction phase of the project will pose potential noise nuisance without mitigation measures in place and the operational phase of the project is predicted to comply with relevant standards such as the Dublin Agglomeration Noise Action Plan and EPA NG4.

12.10.2 Worst Case Scenario

This assessment assumes a worst-case scenario when assessing the construction and operational noise impacts on the surrounding noise sensitive locations. The dominating noise source in the area is road traffic noise, even with the additional traffic from the construction and operational phases the predicted increase is likely less than 1dB(A) at each NSL for the 2042 “Do Something” scenario.

The operational phase of the development will see an increase of traffic volumes on all link roads assessed, however due to the construction of the development, some NSL’s will benefit from screening because of the proposed development and will in turn be predicted to achieve lower onset noise levels from traffic noise. NSL’s such as NSL2, 3, 4 and 7 are predicted to achieve increased noise levels up to 1dB(A) due to the increased road traffic flows during the operational phase.

12.11 INTERACTIONS

This chapter interacts with Chapter 13: Traffic and Transport, AADT/traffic figures were used to predict the construction traffic noise impact and the operational traffic noise impact on the surrounding noise sensitive receptors.

12.12 DIFFICULTIES ENCOUNTERED IN COMPILING

There were no issues encountered while compiling this chapter.

12.13 REFERENCES

- Design Manual for Roads and Bridges Volume 11 Section 3 Part 7 (HD 213/11 – Revision 1) (The Highways Agency et al., 2011);
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings;
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise;
- BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Vibration
- ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures;
- ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise Part 2: Determination of sound pressure levels;
- ISO 9613-1:1993 Acoustics - Attenuation of sound during propagation outdoors -- Part 1: Calculation of the absorption of sound by the atmosphere;
- ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors -- Part 2: General method of calculation;
- British Standard BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings.

- Environmental Protection Agency (2016) Guidance Note for Noise (NG4): Licence Applications, Surveys and Assessments in Relation to Scheduled Activities;
- BS 4142:2014+A1:2019: Methods for rating and assessing industrial and commercial sound.
- Guidelines for the Treatment of Noise & Vibration in National Road Schemes, National Roads Authority, Revision 1, 25th October 2004; and
- Dublin Agglomeration Noise Action Plan 2024 – 2028.
- Maynooth Eastern Ring Road Part VIII Planning Report 2019
- ProPG: Planning & Noise – Professional Practice Guidance on Planning & Noise (2017)

RECEIVED: 02/10/2025

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APPENDIX 12.1

RAW UNATTENDED NOISE MEASUREMENT DATA

Raw unattended noise measurement data.

Date	Time	Duration	Period	Recorded Noise Levels			
				L _{Aeq,15min}	L _{AFmax,15min}	L _{AF10,15min}	L _{AF90,15min}
31/07/2024	17:45:00	15min	Day	49	67	51	45
31/07/2024	18:00:00	15min	Day	48	65	48	45
31/07/2024	18:15:00	15min	Day	51	67	50	47
31/07/2024	18:30:00	15min	Day	50	62	51	48
31/07/2024	18:45:00	15min	Day	48	52	50	47
31/07/2024	19:00:00	15min	Evening	48	55	50	46
31/07/2024	19:15:00	15min	Evening	48	54	49	46
31/07/2024	19:30:00	15min	Evening	48	53	49	46
31/07/2024	19:45:00	15min	Evening	49	60	49	46
31/07/2024	20:00:00	15min	Evening	48	59	49	45
31/07/2024	20:15:00	15min	Evening	47	53	49	46
31/07/2024	20:30:00	15min	Evening	48	57	49	46
31/07/2024	20:45:00	15min	Evening	49	66	50	46
31/07/2024	21:00:00	15min	Evening	51	63	53	46
31/07/2024	21:15:00	15min	Evening	49	59	50	46
31/07/2024	21:30:00	15min	Evening	49	57	51	46
31/07/2024	21:45:00	15min	Evening	50	62	52	47
31/07/2024	22:00:00	15min	Evening	48	53	49	46
31/07/2024	22:15:00	15min	Evening	48	52	50	46
31/07/2024	22:30:00	15min	Evening	51	72	50	45
31/07/2024	22:45:00	15min	Evening	45	54	47	41
31/07/2024	23:00:00	15min	Night	44	51	47	41
31/07/2024	23:15:00	15min	Night	45	52	48	42
31/07/2024	23:30:00	15min	Night	45	51	47	41
31/07/2024	23:45:00	15min	Night	41	50	44	37
01/08/2024	00:00:00	15min	Night	40	50	42	36
01/08/2024	00:15:00	15min	Night	40	51	43	36
01/08/2024	00:30:00	15min	Night	40	49	43	36
01/08/2024	00:45:00	15min	Night	40	49	43	35
01/08/2024	01:00:00	15min	Night	39	51	42	34
01/08/2024	01:15:00	15min	Night	38	56	41	31
01/08/2024	01:30:00	15min	Night	39	58	42	32
01/08/2024	01:45:00	15min	Night	39	51	42	34
01/08/2024	02:00:00	15min	Night	40	50	43	34
01/08/2024	02:15:00	15min	Night	40	51	42	34
01/08/2024	02:30:00	15min	Night	40	51	43	35
01/08/2024	02:45:00	15min	Night	39	51	42	36
01/08/2024	03:00:00	15min	Night	40	54	43	36
01/08/2024	03:15:00	15min	Night	43	50	45	36
01/08/2024	03:30:00	15min	Night	44	52	46	39
01/08/2024	03:45:00	15min	Night	42	50	45	38
01/08/2024	04:00:00	15min	Night	43	51	45	37
01/08/2024	04:15:00	15min	Night	44	54	46	39
01/08/2024	04:30:00	15min	Night	45	55	47	41
01/08/2024	04:45:00	15min	Night	45	53	48	42
01/08/2024	05:00:00	15min	Night	47	54	49	44
01/08/2024	05:15:00	15min	Night	46	53	48	43
01/08/2024	05:30:00	15min	Night	47	59	48	44
01/08/2024	05:45:00	15min	Night	49	59	52	46
01/08/2024	06:00:00	15min	Night	49	60	51	47
01/08/2024	06:15:00	15min	Night	49	54	50	48
01/08/2024	06:30:00	15min	Night	51	68	52	48
01/08/2024	06:45:00	15min	Night	49	54	50	48
01/08/2024	07:00:00	15min	Day	49	54	50	47

Date	Time	Duration	Period	Recorded Noise Levels			
				L _{Aeq,15min}	L _{AFmax,15min}	L _{AF10,15min}	L _{AF90,15min}
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01/08/2024	07:30:00	15min	Day	48	60	49	47
01/08/2024	07:45:00	15min	Day	48	57	50	46
01/08/2024	08:00:00	15min	Day	49	53	50	47
01/08/2024	08:15:00	15min	Day	48	53	50	47
01/08/2024	08:30:00	15min	Day	48	52	49	46
01/08/2024	08:45:00	15min	Day	47	55	49	45
01/08/2024	09:00:00	15min	Day	47	57	48	45
01/08/2024	09:15:00	15min	Day	48	58	50	46
01/08/2024	09:30:00	15min	Day	47	59	50	43
01/08/2024	09:45:00	15min	Day	49	56	52	44
01/08/2024	10:00:00	15min	Day	48	60	51	44
01/08/2024	10:15:00	15min	Day	46	53	47	44
01/08/2024	10:30:00	15min	Day	48	66	50	44
01/08/2024	10:45:00	15min	Day	49	63	50	45
01/08/2024	11:00:00	15min	Day	47	55	49	45
01/08/2024	11:15:00	15min	Day	49	65	50	45
01/08/2024	11:30:00	15min	Day	45	52	47	44
01/08/2024	11:45:00	15min	Day	46	58	48	43
01/08/2024	12:00:00	15min	Day	47	55	48	44
01/08/2024	12:15:00	15min	Day	46	53	48	44
01/08/2024	12:30:00	15min	Day	47	60	48	44
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01/08/2024	15:30:00	15min	Day	45	61	48	42
01/08/2024	15:45:00	15min	Day	43	52	45	42
01/08/2024	16:00:00	15min	Day	46	56	49	41
01/08/2024	16:15:00	15min	Day	45	60	47	42
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01/08/2024	19:00:00	15min	Evening	46	54	49	43
01/08/2024	19:15:00	15min	Evening	46	57	47	43
01/08/2024	19:30:00	15min	Evening	47	53	48	45
01/08/2024	19:45:00	15min	Evening	46	52	48	44
01/08/2024	20:00:00	15min	Evening	45	57	47	44
01/08/2024	20:15:00	15min	Evening	50	68	49	44
01/08/2024	20:30:00	15min	Evening	51	67	49	43
01/08/2024	20:45:00	15min	Evening	45	55	47	43
01/08/2024	21:00:00	15min	Evening	44	51	46	43

Date	Time	Duration	Period	Recorded Noise Levels			
				L _{Aeq,15min}	L _{AFmax,15min}	L _{AF10,15min}	L _{AF90,15min}
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01/08/2024	21:30:00	15min	Evening	48	55	50	46
01/08/2024	21:45:00	15min	Evening	51	58	53	48
01/08/2024	22:00:00	15min	Evening	51	57	53	49
01/08/2024	22:15:00	15min	Evening	50	55	52	48
01/08/2024	22:30:00	15min	Evening	51	59	54	49
01/08/2024	22:45:00	15min	Evening	49	56	51	45
01/08/2024	23:00:00	15min	Night	50	56	52	46
01/08/2024	23:15:00	15min	Night	49	56	51	46
01/08/2024	23:30:00	15min	Night	48	56	50	45
01/08/2024	23:45:00	15min	Night	49	59	51	46
02/08/2024	00:00:00	15min	Night	47	55	49	43
02/08/2024	00:15:00	15min	Night	47	58	50	44
02/08/2024	00:30:00	15min	Night	47	55	49	44
02/08/2024	00:45:00	15min	Night	46	56	49	42
02/08/2024	01:00:00	15min	Night	46	55	49	42
02/08/2024	01:15:00	15min	Night	46	56	48	42
02/08/2024	01:30:00	15min	Night	45	56	48	41
02/08/2024	01:45:00	15min	Night	46	55	49	42
02/08/2024	02:00:00	15min	Night	44	54	47	39
02/08/2024	02:15:00	15min	Night	44	57	47	40
02/08/2024	02:30:00	15min	Night	45	56	47	39
02/08/2024	02:45:00	15min	Night	43	55	46	38
02/08/2024	03:00:00	15min	Night	44	55	46	38
02/08/2024	03:15:00	15min	Night	44	56	47	40
02/08/2024	03:30:00	15min	Night	45	56	48	40
02/08/2024	03:45:00	15min	Night	46	55	49	41
02/08/2024	04:00:00	15min	Night	47	58	50	43
02/08/2024	04:15:00	15min	Night	47	57	50	42
02/08/2024	04:30:00	15min	Night	47	60	49	44
02/08/2024	04:45:00	15min	Night	47	58	50	44
02/08/2024	05:00:00	15min	Night	49	57	51	45
02/08/2024	05:15:00	15min	Night	50	61	52	47
02/08/2024	05:30:00	15min	Night	51	60	53	48
02/08/2024	05:45:00	15min	Night	52	67	54	50
02/08/2024	06:00:00	15min	Night	54	60	56	52
02/08/2024	06:15:00	15min	Night	56	61	57	54
02/08/2024	06:30:00	15min	Night	56	61	57	54
02/08/2024	06:45:00	15min	Night	55	62	57	54
02/08/2024	07:00:00	15min	Day	54	62	56	52
02/08/2024	07:15:00	15min	Day	54	60	55	52
02/08/2024	07:30:00	15min	Day	55	62	56	53
02/08/2024	07:45:00	15min	Day	54	63	56	53
02/08/2024	08:00:00	15min	Day	54	59	55	52
02/08/2024	08:15:00	15min	Day	54	59	55	52
02/08/2024	08:30:00	15min	Day	54	61	55	52
02/08/2024	08:45:00	15min	Day	54	59	56	52
02/08/2024	09:00:00	15min	Day	54	59	56	52
02/08/2024	09:15:00	15min	Day	54	60	56	52
02/08/2024	09:30:00	15min	Day	54	59	55	52
02/08/2024	09:45:00	15min	Day	54	58	55	52
02/08/2024	10:00:00	15min	Day	53	62	54	51
02/08/2024	10:15:00	15min	Day	53	60	55	51
02/08/2024	10:30:00	15min	Day	54	60	55	52
02/08/2024	10:45:00	15min	Day	54	65	56	52
02/08/2024	11:00:00	15min	Day	55	64	57	53

Date	Time	Duration	Period	Recorded Noise Levels			
				L _{Aeq,15min}	L _{AFmax,15min}	L _{AF10,15min}	L _{AF90,15min}
02/08/2024	11:15:00	15min	Day	55	66	57	54
02/08/2024	11:30:00	15min	Day	55	62	56	53
02/08/2024	11:45:00	15min	Day	55	70	56	53
02/08/2024	12:00:00	15min	Day	54	61	55	52
02/08/2024	12:15:00	15min	Day	54	59	55	52
02/08/2024	12:30:00	15min	Day	54	58	55	53
02/08/2024	12:45:00	15min	Day	54	60	55	52
02/08/2024	13:00:00	15min	Day	53	59	55	52
02/08/2024	13:15:00	15min	Day	54	59	55	52
02/08/2024	13:30:00	15min	Day	53	59	54	51
02/08/2024	13:45:00	15min	Day	53	60	55	51
02/08/2024	14:00:00	15min	Day	54	61	55	52
02/08/2024	14:15:00	15min	Day	54	59	55	52
02/08/2024	14:30:00	15min	Day	54	61	55	53
02/08/2024	14:45:00	15min	Day	54	60	55	52
02/08/2024	15:00:00	15min	Day	54	58	55	52
02/08/2024	15:15:00	15min	Day	54	60	56	52
02/08/2024	15:30:00	15min	Day	55	62	56	53
02/08/2024	15:45:00	15min	Day	54	60	55	52
02/08/2024	16:00:00	15min	Day	54	60	55	52
02/08/2024	16:15:00	15min	Day	53	59	55	52
02/08/2024	16:30:00	15min	Day	52	58	54	51
02/08/2024	16:45:00	15min	Day	52	58	54	51
02/08/2024	17:00:00	15min	Day	53	59	54	51
02/08/2024	17:15:00	15min	Day	52	57	54	51
02/08/2024	17:30:00	15min	Day	53	62	54	51
02/08/2024	17:45:00	15min	Day	53	58	54	51
02/08/2024	18:00:00	15min	Day	53	61	55	52
02/08/2024	18:15:00	15min	Day	52	58	54	49
02/08/2024	18:30:00	15min	Day	49	59	51	48
02/08/2024	18:45:00	15min	Day	49	54	50	48
02/08/2024	19:00:00	15min	Evening	49	54	50	48
02/08/2024	19:15:00	15min	Evening	49	54	50	48
02/08/2024	19:30:00	15min	Evening	49	54	50	47
02/08/2024	19:45:00	15min	Evening	49	55	51	48
02/08/2024	20:00:00	15min	Evening	50	58	51	48
02/08/2024	20:15:00	15min	Evening	50	55	51	48
02/08/2024	20:30:00	15min	Evening	50	59	52	49
02/08/2024	20:45:00	15min	Evening	48	57	50	46
02/08/2024	21:00:00	15min	Evening	48	57	50	46
02/08/2024	21:15:00	15min	Evening	49	56	51	48
02/08/2024	21:30:00	15min	Evening	50	56	52	48
02/08/2024	21:45:00	15min	Evening	49	55	51	47
02/08/2024	22:00:00	15min	Evening	50	63	51	47
02/08/2024	22:15:00	15min	Evening	49	59	51	47
02/08/2024	22:30:00	15min	Evening	49	56	51	45
02/08/2024	22:45:00	15min	Evening	48	56	50	45
02/08/2024	23:00:00	15min	Night	47	57	49	44
02/08/2024	23:15:00	15min	Night	46	60	48	43
02/08/2024	23:30:00	15min	Night	46	55	47	43
02/08/2024	23:45:00	15min	Night	46	55	48	43
03/08/2024	00:00:00	15min	Night	46	57	48	43
03/08/2024	00:15:00	15min	Night	46	53	48	43
03/08/2024	00:30:00	15min	Night	46	57	48	43
03/08/2024	01:00:00	15min	Night	45	55	47	42

Date	Time	Duration	Period	Recorded Noise Levels			
				L _{Aeq,15min}	L _{AFmax,15min}	L _{AF10,15min}	L _{AF90,15min}
03/08/2024	01:15:00	15min	Night	45	52	47	40
03/08/2024	01:30:00	15min	Night	44	55	47	40
03/08/2024	01:45:00	15min	Night	44	57	46	38
03/08/2024	02:00:00	15min	Night	47	58	50	42
03/08/2024	02:15:00	15min	Night	45	53	47	39
03/08/2024	02:30:00	15min	Night	45	56	48	41
03/08/2024	02:45:00	15min	Night	45	54	48	38
03/08/2024	03:00:00	15min	Night	45	58	48	40
03/08/2024	03:15:00	15min	Night	47	57	49	43
03/08/2024	03:30:00	15min	Night	47	60	50	41
03/08/2024	03:45:00	15min	Night	47	57	50	40
03/08/2024	04:00:00	15min	Night	47	56	50	44
03/08/2024	04:15:00	15min	Night	46	55	48	41
03/08/2024	04:30:00	15min	Night	47	57	50	42
03/08/2024	04:45:00	15min	Night	48	57	51	42
03/08/2024	05:00:00	15min	Night	49	62	52	44
03/08/2024	05:15:00	15min	Night	48	57	51	44
03/08/2024	05:30:00	15min	Night	49	56	51	46
03/08/2024	05:45:00	15min	Night	50	61	53	46
03/08/2024	06:00:00	15min	Night	51	64	52	48
03/08/2024	06:15:00	15min	Night	51	58	53	49
03/08/2024	06:30:00	15min	Night	52	58	53	50
03/08/2024	06:45:00	15min	Night	50	57	52	48
03/08/2024	07:00:00	15min	Day	50	56	52	48
03/08/2024	07:15:00	15min	Day	49	57	51	47
03/08/2024	07:30:00	15min	Day	49	56	51	47
03/08/2024	07:45:00	15min	Day	50	59	51	47
03/08/2024	08:00:00	15min	Day	48	55	50	47
03/08/2024	08:15:00	15min	Day	49	56	51	47
03/08/2024	08:30:00	15min	Day	50	57	51	48
03/08/2024	08:45:00	15min	Day	50	57	51	48
03/08/2024	09:00:00	15min	Day	50	60	52	48
03/08/2024	09:15:00	15min	Day	50	58	52	48
03/08/2024	09:30:00	15min	Day	50	58	52	48
03/08/2024	09:45:00	15min	Day	51	64	52	49
03/08/2024	10:00:00	15min	Day	51	65	52	48
03/08/2024	10:15:00	15min	Day	51	63	52	48
03/08/2024	10:30:00	15min	Day	51	59	52	49
03/08/2024	10:45:00	15min	Day	51	64	52	49
03/08/2024	11:00:00	15min	Day	51	58	52	49
03/08/2024	11:15:00	15min	Day	52	64	53	49
03/08/2024	11:30:00	15min	Day	53	73	55	51
03/08/2024	11:45:00	15min	Day	52	70	54	49
03/08/2024	12:00:00	15min	Day	52	72	54	49
03/08/2024	12:15:00	15min	Day	52	70	53	50
03/08/2024	12:30:00	15min	Day	51	59	52	49
03/08/2024	12:45:00	15min	Day	51	58	52	49
03/08/2024	13:00:00	15min	Day	51	58	53	50
03/08/2024	13:15:00	15min	Day	52	60	54	50
03/08/2024	13:30:00	15min	Day	51	60	53	49
03/08/2024	13:45:00	15min	Day	51	55	52	49
03/08/2024	14:00:00	15min	Day	51	71	53	49
03/08/2024	14:15:00	15min	Day	51	56	53	49
03/08/2024	14:30:00	15min	Day	51	66	53	48
03/08/2024	14:45:00	15min	Day	51	63	52	48
03/08/2024	15:00:00	15min	Day	52	58	53	50

Date	Time	Duration	Period	Recorded Noise Levels			
				L _{Aeq,15min}	L _{AFmax,15min}	L _{AF10,15min}	L _{AF90,15min}
03/08/2024	15:15:00	15min	Day	51	60	52	49
03/08/2024	15:30:00	15min	Day	51	62	52	49
03/08/2024	15:45:00	15min	Day	51	67	51	48
03/08/2024	16:00:00	15min	Day	48	63	49	46
03/08/2024	16:15:00	15min	Day	48	61	49	45
03/08/2024	16:30:00	15min	Day	49	60	51	47
03/08/2024	16:45:00	15min	Day	49	64	50	46
03/08/2024	17:00:00	15min	Day	48	59	50	46
03/08/2024	17:15:00	15min	Day	46	57	47	44
03/08/2024	17:30:00	15min	Day	45	60	47	42
03/08/2024	17:45:00	15min	Day	47	61	49	44
03/08/2024	18:00:00	15min	Day	49	63	51	46
03/08/2024	18:15:00	15min	Day	49	59	51	46
03/08/2024	18:30:00	15min	Day	48	56	50	46
03/08/2024	18:45:00	15min	Day	49	61	51	47
03/08/2024	19:00:00	15min	Evening	49	60	51	47
03/08/2024	19:15:00	15min	Evening	48	57	50	46
03/08/2024	19:30:00	15min	Evening	48	54	49	46
03/08/2024	19:45:00	15min	Evening	48	69	49	46
03/08/2024	20:00:00	15min	Evening	49	58	50	46
03/08/2024	20:15:00	15min	Evening	48	56	49	46
03/08/2024	20:30:00	15min	Evening	46	55	48	44
03/08/2024	20:45:00	15min	Evening	46	54	47	44
03/08/2024	21:00:00	15min	Evening	46	53	47	44
03/08/2024	21:15:00	15min	Evening	47	54	49	45
03/08/2024	21:30:00	15min	Evening	46	53	48	44
03/08/2024	21:45:00	15min	Evening	45	55	47	43
03/08/2024	22:00:00	15min	Evening	44	51	46	42
03/08/2024	22:15:00	15min	Evening	46	52	48	42
03/08/2024	22:30:00	15min	Evening	46	54	48	44
03/08/2024	22:45:00	15min	Evening	46	55	48	43
03/08/2024	23:00:00	15min	Night	45	54	47	42
03/08/2024	23:15:00	15min	Night	45	55	47	42
03/08/2024	23:30:00	15min	Night	45	53	46	42
03/08/2024	23:45:00	15min	Night	45	55	47	42
04/08/2024	00:00:00	15min	Night	45	57	47	41
04/08/2024	00:15:00	15min	Night	46	56	48	43
04/08/2024	00:30:00	15min	Night	46	58	48	42
04/08/2024	00:45:00	15min	Night	44	54	46	41
04/08/2024	01:00:00	15min	Night	43	53	46	40
04/08/2024	01:15:00	15min	Night	43	53	45	39
04/08/2024	01:30:00	15min	Night	42	57	44	38
04/08/2024	01:45:00	15min	Night	42	51	44	38
04/08/2024	02:00:00	15min	Night	43	53	46	40
04/08/2024	02:15:00	15min	Night	43	52	45	38
04/08/2024	02:30:00	15min	Night	43	54	45	39
04/08/2024	02:45:00	15min	Night	42	53	45	38
04/08/2024	03:00:00	15min	Night	42	52	45	37
04/08/2024	03:15:00	15min	Night	43	54	45	38
04/08/2024	03:30:00	15min	Night	43	53	46	38
04/08/2024	03:45:00	15min	Night	44	55	46	38
04/08/2024	04:00:00	15min	Night	44	55	47	38
04/08/2024	04:15:00	15min	Night	42	51	45	38
04/08/2024	04:30:00	15min	Night	43	53	46	37
04/08/2024	04:45:00	15min	Night	43	54	46	39
04/08/2024	05:00:00	15min	Night	43	51	46	39

Date	Time	Duration	Period	Recorded Noise Levels			
				L _{Aeq,15min}	L _{AFmax,15min}	L _{AF10,15min}	L _{AF90,15min}
04/08/2024	05:15:00	15min	Night	45	54	47	40
04/08/2024	05:30:00	15min	Night	45	57	47	41
04/08/2024	05:45:00	15min	Night	46	56	49	41
04/08/2024	06:00:00	15min	Night	47	55	50	44
04/08/2024	06:15:00	15min	Night	50	60	52	46
04/08/2024	06:30:00	15min	Night	50	58	52	47
04/08/2024	06:45:00	15min	Night	49	56	51	47
04/08/2024	07:00:00	15min	Day	48	56	50	46
04/08/2024	07:15:00	15min	Day	48	54	50	46
04/08/2024	07:30:00	15min	Day	49	58	51	46
04/08/2024	07:45:00	15min	Day	50	70	51	46
04/08/2024	08:00:00	15min	Day	50	66	51	47
04/08/2024	08:15:00	15min	Day	49	56	51	46
04/08/2024	08:30:00	15min	Day	51	67	52	47
04/08/2024	08:45:00	15min	Day	51	60	53	49
04/08/2024	09:00:00	15min	Day	50	57	52	48
04/08/2024	09:15:00	15min	Day	51	57	53	49
04/08/2024	09:30:00	15min	Day	52	57	53	50
04/08/2024	09:45:00	15min	Day	52	58	54	50
04/08/2024	10:00:00	15min	Day	52	58	53	50
04/08/2024	10:15:00	15min	Day	53	62	54	50
04/08/2024	10:30:00	15min	Day	52	64	54	50
04/08/2024	10:45:00	15min	Day	55	70	56	51
04/08/2024	11:00:00	15min	Day	55	72	56	52
04/08/2024	11:15:00	15min	Day	54	61	56	52
04/08/2024	11:30:00	15min	Day	55	61	57	53
04/08/2024	11:45:00	15min	Day	55	65	57	53
04/08/2024	12:00:00	15min	Day	55	63	57	54
04/08/2024	12:15:00	15min	Day	55	60	56	53
04/08/2024	12:30:00	15min	Day	55	60	57	54
04/08/2024	12:45:00	15min	Day	60	79	58	54
04/08/2024	13:00:00	15min	Day	56	62	57	54
04/08/2024	13:15:00	15min	Day	55	59	57	54
04/08/2024	13:30:00	15min	Day	56	64	57	54
04/08/2024	13:45:00	15min	Day	56	64	57	54
04/08/2024	14:00:00	15min	Day	56	60	57	54
04/08/2024	14:15:00	15min	Day	56	61	57	54
04/08/2024	14:30:00	15min	Day	56	63	57	54
04/08/2024	14:45:00	15min	Day	56	60	57	54
04/08/2024	15:00:00	15min	Day	56	60	57	54
04/08/2024	15:15:00	15min	Day	56	62	57	54
04/08/2024	15:30:00	15min	Day	55	61	57	54
04/08/2024	15:45:00	15min	Day	56	61	57	54
04/08/2024	16:00:00	15min	Day	55	61	56	53
04/08/2024	16:15:00	15min	Day	55	65	57	53
04/08/2024	16:30:00	15min	Day	55	61	57	53
04/08/2024	16:45:00	15min	Day	55	60	56	53
04/08/2024	17:00:00	15min	Day	54	63	56	53
04/08/2024	17:15:00	15min	Day	55	61	56	53
04/08/2024	17:30:00	15min	Day	55	58	56	53
04/08/2024	17:45:00	15min	Day	55	68	57	54
04/08/2024	18:00:00	15min	Day	55	63	57	54
04/08/2024	18:15:00	15min	Day	55	64	56	53
04/08/2024	18:30:00	15min	Day	56	64	57	54
04/08/2024	18:45:00	15min	Day	55	61	57	54
04/08/2024	19:00:00	15min	Evening	54	60	55	52

Date	Time	Duration	Period	Recorded Noise Levels			
				L _{Aeq,15min}	L _{AFmax,15min}	L _{AF10,15min}	L _{AF90,15min}
04/08/2024	19:15:00	15min	Evening	54	59	56	53
04/08/2024	19:30:00	15min	Evening	54	60	55	52
04/08/2024	19:45:00	15min	Evening	54	61	55	52
04/08/2024	20:00:00	15min	Evening	53	59	55	51
04/08/2024	20:15:00	15min	Evening	53	65	54	51
04/08/2024	20:30:00	15min	Evening	52	58	54	50
04/08/2024	20:45:00	15min	Evening	52	60	54	50
04/08/2024	21:00:00	15min	Evening	52	58	53	50
04/08/2024	21:15:00	15min	Evening	52	58	53	49
04/08/2024	21:30:00	15min	Evening	51	57	53	48
04/08/2024	21:45:00	15min	Evening	50	59	52	47
04/08/2024	22:00:00	15min	Evening	50	57	52	48
04/08/2024	22:15:00	15min	Evening	51	71	52	47
04/08/2024	22:30:00	15min	Evening	49	58	51	46
04/08/2024	22:45:00	15min	Evening	49	58	51	47
04/08/2024	23:00:00	15min	Night	49	56	51	46
04/08/2024	23:15:00	15min	Night	48	59	51	45
04/08/2024	23:30:00	15min	Night	48	57	51	45
04/08/2024	23:45:00	15min	Night	48	59	50	46
05/08/2024	00:00:00	15min	Night	48	57	50	45
05/08/2024	00:15:00	15min	Night	47	57	49	44
05/08/2024	00:30:00	15min	Night	47	58	50	45
05/08/2024	00:45:00	15min	Night	47	59	49	44
05/08/2024	01:00:00	15min	Night	46	58	49	43
05/08/2024	01:15:00	15min	Night	47	55	49	44
05/08/2024	01:30:00	15min	Night	46	58	49	43
05/08/2024	01:45:00	15min	Night	46	59	48	42
05/08/2024	02:00:00	15min	Night	45	55	47	41
05/08/2024	02:15:00	15min	Night	47	57	49	43
05/08/2024	02:30:00	15min	Night	47	59	49	43
05/08/2024	02:45:00	15min	Night	48	65	50	45
05/08/2024	03:00:00	15min	Night	49	57	51	45
05/08/2024	03:15:00	15min	Night	48	56	50	44
05/08/2024	03:30:00	15min	Night	46	55	49	43
05/08/2024	03:45:00	15min	Night	46	58	48	43
05/08/2024	04:00:00	15min	Night	46	58	49	42
05/08/2024	04:15:00	15min	Night	46	65	49	42
05/08/2024	04:30:00	15min	Night	47	57	49	43
05/08/2024	04:45:00	15min	Night	46	59	49	42
05/08/2024	05:00:00	15min	Night	45	57	48	39
05/08/2024	05:15:00	15min	Night	46	54	49	42
05/08/2024	05:30:00	15min	Night	48	58	50	45
05/08/2024	05:45:00	15min	Night	47	56	49	44
05/08/2024	06:00:00	15min	Night	51	62	53	47
05/08/2024	06:15:00	15min	Night	51	60	53	48
05/08/2024	06:30:00	15min	Night	51	64	53	48
05/08/2024	06:45:00	15min	Night	53	68	55	49
05/08/2024	07:00:00	15min	Day	51	70	52	48
05/08/2024	07:15:00	15min	Day	50	57	52	47
05/08/2024	07:30:00	15min	Day	51	59	53	49
05/08/2024	07:45:00	15min	Day	50	59	52	48
05/08/2024	08:00:00	15min	Day	50	58	52	48
05/08/2024	08:15:00	15min	Day	50	60	52	47
05/08/2024	08:30:00	15min	Day	50	57	52	48
05/08/2024	08:45:00	15min	Day	51	60	53	48
05/08/2024	09:00:00	15min	Day	51	59	52	48

Date	Time	Duration	Period	Recorded Noise Levels			
				L _{Aeq,15min}	L _{AFmax,15min}	L _{AF10,15min}	L _{AF90,15min}
05/08/2024	09:15:00	15min	Day	51	58	53	49
05/08/2024	09:30:00	15min	Day	52	58	53	49
05/08/2024	09:45:00	15min	Day	52	60	53	50
05/08/2024	10:00:00	15min	Day	52	58	54	50
05/08/2024	10:15:00	15min	Day	53	59	54	51
05/08/2024	10:30:00	15min	Day	53	59	54	52
05/08/2024	10:45:00	15min	Day	53	59	54	51
05/08/2024	11:00:00	15min	Day	54	70	55	51
05/08/2024	11:15:00	15min	Day	54	58	55	52
05/08/2024	11:30:00	15min	Day	53	58	55	52
05/08/2024	11:45:00	15min	Day	54	59	55	52
05/08/2024	12:00:00	15min	Day	54	60	55	52
05/08/2024	12:15:00	15min	Day	54	63	55	52
05/08/2024	12:30:00	15min	Day	54	64	55	52
05/08/2024	12:45:00	15min	Day	54	60	56	53
05/08/2024	13:00:00	15min	Day	54	60	55	52
05/08/2024	13:15:00	15min	Day	54	62	56	52
05/08/2024	13:30:00	15min	Day	53	59	55	51
05/08/2024	13:45:00	15min	Day	45	56	46	43
05/08/2024	14:00:00	15min	Day	45	58	46	43
05/08/2024	14:15:00	15min	Day	44	50	45	43
05/08/2024	14:30:00	15min	Day	44	53	45	42
05/08/2024	14:45:00	15min	Day	43	54	45	42
05/08/2024	15:00:00	15min	Day	43	57	45	41
05/08/2024	15:15:00	15min	Day	43	54	45	41
05/08/2024	15:30:00	15min	Day	45	54	47	44
05/08/2024	15:45:00	15min	Day	44	54	45	42
05/08/2024	16:00:00	15min	Day	44	50	45	43
05/08/2024	16:15:00	15min	Day	44	53	45	42
05/08/2024	16:30:00	15min	Day	45	52	46	43
05/08/2024	16:45:00	15min	Day	45	52	46	43
05/08/2024	17:00:00	15min	Day	49	68	48	44
05/08/2024	17:15:00	15min	Day	45	53	46	43
05/08/2024	17:30:00	15min	Day	44	56	46	43
05/08/2024	17:45:00	15min	Day	46	56	47	44
05/08/2024	18:00:00	15min	Day	46	55	47	45
05/08/2024	18:15:00	15min	Day	45	51	46	44
05/08/2024	18:30:00	15min	Day	45	55	47	42
05/08/2024	18:45:00	15min	Day	43	56	44	41
05/08/2024	19:00:00	15min	Evening	44	55	45	42
05/08/2024	19:15:00	15min	Evening	46	60	47	44
05/08/2024	19:30:00	15min	Evening	48	54	49	46
05/08/2024	19:45:00	15min	Evening	47	51	48	46
05/08/2024	20:00:00	15min	Evening	49	53	50	46
05/08/2024	20:15:00	15min	Evening	51	56	52	50
05/08/2024	20:30:00	15min	Evening	50	61	52	49
05/08/2024	20:45:00	15min	Evening	49	54	50	47
05/08/2024	21:00:00	15min	Evening	48	61	50	47
05/08/2024	21:15:00	15min	Evening	49	55	51	47
05/08/2024	21:30:00	15min	Evening	50	59	52	48
05/08/2024	21:45:00	15min	Evening	50	56	52	48
05/08/2024	22:00:00	15min	Evening	50	56	52	48
05/08/2024	22:15:00	15min	Evening	49	55	50	47
05/08/2024	22:30:00	15min	Evening	47	54	49	44
05/08/2024	22:45:00	15min	Evening	47	55	50	45
05/08/2024	23:00:00	15min	Night	46	61	48	43

Date	Time	Duration	Period	Recorded Noise Levels			
				L _{Aeq,15min}	L _{AFmax,15min}	L _{AF10,15min}	L _{AF90,15min}
05/08/2024	23:15:00	15min	Night	46	54	48	42
05/08/2024	23:30:00	15min	Night	46	55	48	42
05/08/2024	23:45:00	15min	Night	45	55	48	42
06/08/2024	00:00:00	15min	Night	45	55	48	42
06/08/2024	00:15:00	15min	Night	45	55	47	42
06/08/2024	00:30:00	15min	Night	45	53	47	41
06/08/2024	00:45:00	15min	Night	45	54	48	39
06/08/2024	01:00:00	15min	Night	45	58	48	38
06/08/2024	01:15:00	15min	Night	45	55	48	39
06/08/2024	01:30:00	15min	Night	45	56	48	38
06/08/2024	01:45:00	15min	Night	45	56	48	41
06/08/2024	02:00:00	15min	Night	47	58	50	41
06/08/2024	02:15:00	15min	Night	46	56	49	40
06/08/2024	02:30:00	15min	Night	49	58	51	44
06/08/2024	02:45:00	15min	Night	47	62	50	41
06/08/2024	03:00:00	15min	Night	46	56	49	41
06/08/2024	03:15:00	15min	Night	47	58	50	42
06/08/2024	03:30:00	15min	Night	47	57	50	43
06/08/2024	03:45:00	15min	Night	48	56	50	43
06/08/2024	04:00:00	15min	Night	49	57	51	45
06/08/2024	04:15:00	15min	Night	49	57	51	46
06/08/2024	04:30:00	15min	Night	50	64	52	46
06/08/2024	04:45:00	15min	Night	50	60	52	47
06/08/2024	05:00:00	15min	Night	51	60	53	48
06/08/2024	05:15:00	15min	Night	53	60	55	49
06/08/2024	05:30:00	15min	Night	54	60	56	51
06/08/2024	05:45:00	15min	Night	55	61	57	54
06/08/2024	06:00:00	15min	Night	57	61	58	55
06/08/2024	06:15:00	15min	Night	57	61	59	56
06/08/2024	06:30:00	15min	Night	55	61	57	52
06/08/2024	06:45:00	15min	Night	54	57	55	52
06/08/2024	07:00:00	15min	Day	55	60	56	53
06/08/2024	07:15:00	15min	Day	55	60	57	52
06/08/2024	07:30:00	15min	Day	54	62	57	51
06/08/2024	07:45:00	15min	Day	55	60	56	53
06/08/2024	08:00:00	15min	Day	55	63	56	53
06/08/2024	08:15:00	15min	Day	55	62	56	53
06/08/2024	08:30:00	15min	Day	55	63	57	54
06/08/2024	08:45:00	15min	Day	54	59	56	53
06/08/2024	09:00:00	15min	Day	56	70	56	52
06/08/2024	09:15:00	15min	Day	56	71	56	53
06/08/2024	09:30:00	15min	Day	53	59	55	51
06/08/2024	09:45:00	15min	Day	53	64	55	51
06/08/2024	10:00:00	15min	Day	53	60	54	51
06/08/2024	10:15:00	15min	Day	53	58	54	50
06/08/2024	10:30:00	15min	Day	53	60	55	51
06/08/2024	10:45:00	15min	Day	53	58	55	51
06/08/2024	11:00:00	15min	Day	53	59	54	51
06/08/2024	11:15:00	15min	Day	53	58	54	51
06/08/2024	11:30:00	15min	Day	52	70	53	50
06/08/2024	11:45:00	15min	Day	53	62	54	50
06/08/2024	12:00:00	15min	Day	53	59	55	51
06/08/2024	12:15:00	15min	Day	53	60	54	51