AIR QUALITY & CLIMATE IMPACT ASSESSMENT

FOR

GROODY DEVELOPMENTS LIMITED

AT

WHITEBOX STUDENT CAMPUS DEVELOPMENT
GROODY ROAD
NEWCASTLE
CASTLETROY
LIMERICK

Prepared for
Groody Developments Limited

Prepared by:
Traynor Environmental Ltd

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This report refers, within the limitations stated, to the condition of the site at the time of the report. No warranty is given as to the possibility of future changes in the condition of the site. The report as presented is based on the information sources as detailed in this report, and hence maybe subject to review in the future if more information is obtained or scientific understanding changes.

CONTENTS

1.0 INTRODUCTION

This Air Quality& Climate Impact Assessment has been prepared to identify and assess the potential air quality and climatic impacts associated with the proposed development during the Construction and Operational Phases of the development.

It includes a comprehensive description of

- the existing air quality and climate at and in the vicinity of the subject site,
- how the construction and operational phases of the development may impact existing air quality and climate.
- the mitigation measures that shall be implemented to control and minimise the impact that the development may have on local ambient air quality and reduce the impact on the local microclimate.

1.1 Proposed Development Site Location and Brief Description

The subject site is located within the development boundary of Limerick City c. 3.0km west of Limerick City Centre. There is existing residential housing estates located to the east of the proposed site. The development consisting of 196 no. Bed Clusters, is distributed across 5 no. separate blocks, ranging in height from 5 - 8 storeys, with a total of 1,400 no. student bedspaces.

1.2 Statement of Competence

This assessment has been prepared by Killian Bannon and reviewed by Nevin Traynor, of Traynor Environmental Ltd. Killian is an environmental consultant with over 10 years' experience in the commercial sector where he has undertaken extensive site surveys, watching briefs and report writing. He holds a BSc in Agricultural Science. Nevin Traynor is a Senior Environmental Consultant with Traynor Environmental; with over 25 years' experience in the environmental sector. His project experience includes the management and productions of Environmental Impact Statements (EISs)/EIARs, particularly within the Commercial/Industrial and Housing Sector.

2.0 METHODOLOGY

The general assessment methodology of the potential impact of the proposed development on air quality and climate has been devised in accordance with:

- 2017 EPA Guidelines on information to be contained in Environmental Impact Assessment Reports.
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Environmental Protection Agency, 2015. Revised Guidelines on the Information to be Contained in Environmental Impact Statements.
- Environmental Protection Agency, 2015. Draft Advice Notes for Preparation of Environmental Impact Statements.
- Environmental Impact Assessment (EIA), Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003).
- Development Management Guidelines (DoEHLG, 2007).
- European Union (Planning & Development) (Environmental Impact Assessment Regulations 2018).
- Design Manual for Roads and Bridges (DMRB).
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018)
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (May 2022).

- 2030 Climate and Energy Policy Framework (European Commission, 2014).
- Technical guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021a).
- 2030 EU Climate Target Plan (European Commission, 2021b).
- Climate Action and Low Carbon Development (Amendment) Act 2021 (the 2021 Climate Act) (No. 32 of 2021) (Government of Ireland, 2021).
- Climate Action Plan 2024 (DECC, 2023a).
- Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (hereafter referred to as the IEMA 2020 EIA Guide) (IEMA, 2020a).
- GHG Management Hierarchy (hereafter referred to as the IEMA 2020 GHG Management Hierarchy) (IEMA, 2020b).
- Assessing Greenhouse Gas Emissions and Evaluating their Significance (Institute of Environmental Management & Assessment (IEMA), 2022).
- Environmental Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance (hereafter referred to as the IEMA GHG Guidance) (IEMA, 2022); and
- UK Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 Climate (Highways England, 2021).

2.1 Baseline Environment

The existing ambient air quality in the vicinity of the site has been characterised with information obtained from a number of sources including EPA Annual Air Quality in Ireland Reports and Local air monitoring stations data.

The ambient air quality data collected and reviewed for the purpose of this study focused on the principal substances (dust, vehicle exhaust emissions and boiler emissions) which may be released from the site during the construction and operation phases, and which may exert an influence on local air quality.

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 NO_2, PM_{10}, 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 NO_2, PM_{10}, and $PM_{2.5}$ are set out in Table 2.1.

Table 2.1 Ambient Air Quality Standards & TA Luft

Pollutant	Regulation Note1	Limit Type	Value
Dust Deposition	TA Luft (German VDI, 2002)	Annual average limit for nuisance dust	350 mg/m²/day
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m³
		Annual limit for protection of human health	40 µg/m³
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/m³ PM_{10}
		Annual limit for protection of human health	40 µg/m³ PM_{10}
Particulate Matter (as $PM_{2.5}$) – Stage 1	2008/50/EC	Annual limit for protection of human health	25 µg/m³ $PM_{2.5}$
Particulate Matter (as $PM_{2.5}$) – Stage 2	2008/50/EC	Annual limit for protection of human health	20 µg/m³ $PM_{2.5}$

In April 2023, the Government of Ireland published the Clean Air Strategy for Ireland (Government of Ireland, 2023), which provides a high-level strategic policy framework needed to reduce air pollution. The strategy commits Ireland to achieving the 2021 WHO Air Quality Guidelines Interim Target 3 (IT3) by 2026, the IT4 targets by 2030 and the final targets by 2040 (shown in Table 2.2).

The strategy notes that a significant number of EPA monitoring stations observed air pollution levels in 2021 above the WHO targets; 80% of these stations would fail to meet the final $PM_{2.5}$ target of 5 µg/m³. The strategy also acknowledges that "*meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both $PM_{2.5}$ and NO_2*". Ireland will revise its air quality legislation in line with the proposed EU revisions to the CAFE Directive, which will set interim 2030 air quality standards and align the EU more closely with the WHO targets.

Table 2.2 WHO Air Quality Guidelines

Pollutant	Regulation	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
NO_2	WHO Air Quality Guidelines	24-hour limit for protection of human health	50µg/m³ NO_2	50µg/ m³ NO_2	25µg/ m³ NO_2
		Annual limit for protection of human health	30µg/ m³ NO_2	20µg/ m³ NO_2	10µg/ m³ NO_2
PM (as PM_{10})		24-hour limit for protection of human health	75µg/ m³ PM_{10}	50µg/ m³ PM_{10}	45µg/ m³ PM_{10}
		Annual limit for protection of human health	30µg/ m³ PM_{10}	20µg/ m³ PM_{10}	15µg/ m³ PM_{10}
PM (as $PM_{2.5}$)		24-hour limit for protection of human health	37.5µg/m³ $PM_{2.5}$	25µg/ m³ $PM_{2.5}$	15µg/ m³ $PM_{2.5}$
		Annual limit for protection of human health	15µg/ m³ $PM_{2.5}$	10µg/ m³ $PM_{2.5}$	5µg/ m³ $PM_{2.5}$

In order to assess a wider range of air pollutants in the development area it is necessary to review current air quality monitoring data from published sources such as the most recent EPA's 2023 Annual report entitled Air Quality in Ireland. This EPA report provides detailed monitoring data collected from a number of monitoring locations throughout Ireland on an annual basis to assess national compliance with National Air Quality Regulations. The location of the site at Groody Road, Newcastle, Castletroy, Limerick is characterised as a Zone C area as defined by the EPA.

EU legislation on air quality requires that Member States divide their territory into zones for the assessment and management of air quality. The zones currently in place in Ireland in are as follows:

- Zone A is the Dublin conurbation,
- Zone B is the Cork conurbation.
- Zone C comprising 23 large towns in Ireland with a population >15,000.
- Zone D is the remaining area of Ireland.

The zones changed on 1 January 2013 to reflect the results of the 2011 census. The air quality in each zone is assessed and classified with respect to upper and lower assessment thresholds based on measurements over the previous five years. Upper and lower assessment thresholds are prescribed in the legislation for each pollutant. The number of monitoring locations required is dependent on population size and whether ambient air quality concentrations exceed the upper assessment threshold, are between the upper and lower assessment thresholds, or are below the lower assessment threshold.

2.2 Design Manual for Roads and Bridges (DMRB) Guidelines.

The DMRB Model is based on the UK Highway Agency's DMRB and adapts it for use on national roads in Ireland through a series of implementation documents. Due to the lack of such a model in Ireland the UK DMRB was used to predict vehicle emissions from the new development. DMRB Volume II, section 3, Part 1 Air Quality provides a screening model which is used to predict vehicle emissions for NO_2, PM_{10}, carbon monoxide, benzene and 1,3-butadiene at sensitive receptors which have potential to be affected by the proposed development.

The DMRB model requires a number of inputs such as traffic flow (AADT), speed and vehicle mix and annual background pollutant concentrations. Background pollutant concentrations according to air zone were attained by averaging six years of data, from yearly EPA air quality reports for 2016-2021. Predicted concentrations for the construction and operation phases of the project were compared with the Irish ambient air quality standard – S.I. No.180 of 2011 – Air Quality Standards Regulations 2011. These regulations set limit values and averaging periods, which are used to assess the impact of emissions on human health, vegetation, and ecosystem.
Key pollutant concentrations were predicted for nearby sensitive receptors for the following scenarios:

- The baseline scenario (2024), for model verification.
- Do-Nothing scenario (DN), which assumes the retention of present site usage with no development in place (2026).
- Year Do-Something scenario (DS), which assumes the proposed development in place (2026).
- Design Year Do-Nothing scenario (DN), which assumes the retention of present site usage with no development in place (2041); and
- Design Year Do-Something scenario (DS), which assumes the proposed development in place (2041).

The assessment methodology involved using the DMRB Screening Model (Version 1.03c, July 2007), the NO_2 Conversion Spreadsheet (Version 5.1, June 2016), and following guidance issued by the TII, and the EPA. The TII guidance states that the assessment must progress to detailed modelling if:

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

The TII guidance 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:

- Road alignment changes to 5 metres or more.
- Daily traffic flow changes by 1,000 AADT or more.
- HGV flows change by 200 vehicles per day or more.
- Daily average speed changes by 10 km/h or more; or
- Peak hour speed changes by 20 km/h or more.

Concentrations of key pollutants are calculated at sensitive receptors that have the potential to be affected by the proposed development. For road links which are deemed to be affected by the proposed development and within 200 m of the chosen sensitive receptor's inputs to the air dispersion model consist of: road layouts, receptor locations, traffic movements, percentage heavy goods vehicles, annual average traffic speeds and background concentrations. The DMRB guidance states that road links at a distance of greater than 200 m from a sensitive receptor will not influence pollutant concentrations at the receptor. Using this data, the model predicts the road traffic contribution to ambient ground level concentrations at the worst-case sensitive receptors using generic meteorological data. The DMRB model uses conservative emission factors, the formulae for which are outlined in the DMRB Volume 11 Section 3 Part 1 – HA 207/07 Annexes B3 and B4. These worst-case road contributions are then added to the existing background concentrations to give the worst-case predicted ambient concentrations. The worst-case 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. The TII Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes detail a methodology for determining air quality impact significance criteria for road schemes and this can be applied to any project that causes a change in traffic flows. The degree of impact is determined based on both the absolute and relative impact of the proposed development.

The TII significance criteria have been adopted for the proposed development. The significance criteria are based on PM_{10} and NO_2 as these pollutants are most likely to exceed the annual mean limit values (40 µg/m^3). However, the criteria have also been applied to the predicted 8-hour CO, annual benzene and annual $PM_{2.5}$ concentrations for the purposes of this assessment.

2.3 Transport Infrastructure Ireland (TII) Guidelines

2.3.1 Construction Phase

As stated in the TII Guidance it is "*very difficult to accurately dust emissions arising from construction activities.*" "*A semi quantitative approach is recommended to determine the likelihood of a significant impact, which should be combined with an assessment of the proposed mitigation measures.*"

The semi-quantitative assessment outlined is used to assess the impact of the dust during the construction phase. TII guidance states that dust emissions from construction sites can lead to elevated PM_{10} concentrations and can cause soiling of properties. The impact of dust emissions during the construction phase is assessed by estimating the area over which there is a risk of significant impacts, in line with the TII guidance. Emissions from construction vehicles are assessed where construction traffic results in a significant (>10%) increase in AADT flows near sensitive receptors in accordance with the TII guidance.

2.3.2 Operational Phase

The TIFs Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes specifies that the changes in pollutant concentrations alongside roads with a significant change in traffic should be assessed. It states that receptors should be considered at all road links where a greater than 5% change in flows or speeds is predicted for the "Do-Something" option.

Significance criteria have been adopted from the TII guidelines and these are presented in Appendix 2. The TII guidelines requires the consideration of nitrogen deposition impacts at ecological sites that are located within 200m of the proposed development.

2.3.3 Construction Impact Assessment Criteria

Transport Infrastructure Ireland's 'Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes' (Revision 1, 2011) states that:

> "*It is very difficult to accurately quantify dust emissions arising from construction activities*" and that "*it is thus not possible to easily predict changes to dust soiling rates or PM_{10} concentrations.*"

The guidance advises the use of a semi-quantitative approach to determine the likelihood of a significant impact which should be combined with an assessment of the proposed mitigation measures. The impact of construction related dust emissions is assessed by estimating the area over which there is a risk of significant impacts as per the NRA guidance. The construction assessment criteria, reproduced from the NRA guidance, are set out in Appendix 3 below.

2.3.4 Operational Impact Assessment Criteria

Once operational the proposed development may impact on air quality as a result of the requirements of new buildings to be heated and with the increased traffic movements associated with the development.

Air quality significance criteria are assessed on the basis of compliance with the national air quality limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

2.3.5 Climate Assessment Methodology

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

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019). The Climate Action Plan 2019 (CAP19) outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The current Climate Action Plan is CAP24, published in December 2022 (DECC, 2023a).

Following on from Ireland declaring a climate and biodiversity emergency in May 2019, and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government published the Climate Action and Low Carbon Development (Amendment) Act 2021 (hereafter referred to as the 2021 Climate Act) in March 2021 (Government of Ireland, 2021). The Climate Act was signed into Law on the 23rd of July 2021, giving statutory effect to the core objectives stated within the first Climate Action Plan.

The purpose of the 2021 Climate Act is to provide for the approval of plans "*to reduce the extent of further global warming, 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*". This is known as the "*national climate objective,*" which supersedes the 2015 Climate Act "*national transition objective*". The 2021 Climate Act will also "*provide for carbon budgets and a decarbonisation target range for certain sectors of the economy*". The 2021 Climate Act defines the carbon budget as "*the total amount of greenhouse gas emissions that are permitted during the budget period*".

In relation to carbon budgets, the 2021 Climate Action and Low Carbon Development (Amendment) Act states "*A carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')*". The carbon budget is to be produced for 3 sequential budget periods, as shown in Table 2.3 The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. In relation to the sectoral emissions ceiling, the Minister for the Environment, Climate and Communications (the Minister for the Environment) shall prepare and submit to government the maximum amount of Greenhouse Gas (GHG) emissions that are permitted in different sectors of the economy during a budget period and different ceilings may apply to different sectors. The sectorial emission ceilings for 2030 were published in the Climate Action Plan 2024 (CAP24) (DECC, 2023a) and are shown in Table 2.4 Industry and Buildings (Residential) have a 35% and 40% reduction requirement respectively and a 2030 emission ceiling of 4 Mt CO_2e.

Table 2.3: Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025

Budget Period	Carbon Budget	Reduction Required
2021-2025	295 Mt CO_2e	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_2e	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_2e	Reduction in emissions of 3.5% per annum for the third provisional budget.

(Source: Climate Action Plan (CAP) 2023)

Table 2.4: Sectoral Emission Ceilings 2030

Sector	Baseline ($MtCO_2e$)	Carbon Budgets ($MtCO_2e$)		2030 Emissions ($MtCO_2e$)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)
	2018	2021 - 2025	2026 - 2030		
Electricity	10	40	20	3	75
Transport	12	54	37	6	50
Built Environment - Residential	7	29	23	4	40
Built Environment - Commercial	2	7	5	1	45
Industry	7	30	24	4	35
Agriculture	23	106	96	17.25	25
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Land Use, Land-use Change and Forestry (LULUCF)	5	Reflecting the continued volatility for LULUCF baseline emissions to 2030 and beyond, CAP24 puts in place ambitious activity targets for the sector reflecting an EU-type approach.			
Total	68				
Unallocated Savings	-	-	26	-5.25	-
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	-	295	200	-	51

(Source: CAP 2023)

2.3.6 Policy

In December 2023 the current Climate Action Plan, CAP24, was published (Government of Ireland, 2023). This CAP builds on the progress of CAP23, which first published carbon budgets and sectoral emissions ceilings, and it aims to implement the required changes to achieve a 51% reduction in carbon emissions by 2030 and 2050 net zero goal. The CAP has six vital high impact sectors where the biggest savings can be made: renewable energy, energy efficiency of buildings, transport, sustainable farming, sustainable business and change of land-use. CAP24 states that the decarbonisation of Ireland's manufacturing industry is key for Ireland's economy and future competitiveness. There is a target to reduce the embodied carbon in construction materials by 10% for materials produced and used in Ireland by 2025 and by at least 30% for materials produced and used in Ireland by 2030. CAP24 states that these reductions can be brought about by product substitution for construction materials and reduction of clinker content in cement. Cement and other high embodied carbon construction elements can be reduced by the adoption of the methods set out in the Construction Industry Federation 2021 report Modern Methods of Construction. In order to ensure economic growth can continue alongside a reduction in emissions, the IDA Ireland will also seek to attract businesses to invest in decarbonisation technologies.

In April 2023, the Government published its Long-Term Strategy on Greenhouse Gas Emissions Reductions. This strategy provides a long-term plan on how Ireland will transition towards net carbon zero by 2050, achieving the interim targets set out in the Climate Action Plan.

The Limerick City & County Council (LCCC) Climate Action Plan 2024-2029 outlines the goals to mitigate GHG emissions and plans to prepare for and adapt to climate change. LCCC Climate Action Plan has a target to reduce the Council's GHG emissions by 50% by 2030 and have set out key objectives to address this target step by step. LCCC's objectives are intended to focus work on the key areas of public transport, active travel and modal shift, LCCC fleet, and electric vehicle charging, with specific actions targeting each of these areas.

The LCCC Climate Action Plan highlights the risks that climate change poses from the transportation network and uncontrolled fires to detrimental impacts on biodiversity, restriction to water supply and potential risk of flooding, with risks mainly associated with extreme weather events. The LCCC Climate Action Plan notes that cold spells and flooding (pluvial, fluvial coastal, etc.) and have the greatest future risk when both the likelihood and consequence are accounted for. Increases in flooding will cause an inundation of residential properties, damage to commercial buildings and premises, and disruption of transport networks.

2.3.7 Climate Change Risk Assessment

The assessment involves determining the vulnerability of the proposed development to climate change. This involves an analysis of the sensitivity and exposure of the development to climate hazards which together provide a measure of vulnerability.

PE-ENV-01104 (TII, 2022a) states that the CCRA is guided by the principles set out in the overarching best practice guidance documents:

- Technical guidance on the climate proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021a); and
- The Institute of Environmental Management and Assessment, Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2nd Edition) (IEMA, 2020).

The baseline environmental information and input from other experts working on the proposed development be used in order to assess the likelihood of climate risk.

First an initial screening CCRA based on the operational phase is carried out, according to the TII guidance PE-ENV-01104. This is carried out by determining the sensitivity of proposed development assets (i.e. receptors) and their exposure to climate change hazards.

The proposed development asset categories must be assigned a level of sensitivity to climate hazards. PE-ENV-01104 (TII, 2022a) provides the list below of asset categories and climate hazards to be considered. The asset categories will vary for development type and need to be determined on a development-by-development 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 is undertaken. 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 to a level of High, Medium or Low as per the criteria below.

- 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.

2.3.7.1 Significance Criteria for CCRA

The CCRA involves an initial screening assessment to determine the vulnerability of the proposed development to various climate hazards. The vulnerability is determined by combining sensitivity and the exposure of the proposed development to various climate hazards. The vulnerability assessment takes any proposed mitigation into account.

Vulnerability = Sensitivity x Exposure

Table 2.5 details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale. A risk that is low or medium is classed as non-significant, while a high or extreme risk is classed as a significant risk.

TII guidance (TII, 2022a) and the EU technical guidance (European Commission, 2021a) note that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed. The impact from climate change on a development would therefore be considered not significant.

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. An assessment of construction phase CCRA impacts is only required according to the TII guidance (TII, 2022a) if a detailed CCRA is required.

Table 2.5 Vulnerability Matrix

		Exposure		
		High (3)	**Medium (2)**	**Low (1)**
Sensitivity	**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 screening CCRA, detailed 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, the best practice mitigation against climate hazards is still recommended.

3.0 RECEIVING ENVIRONMENT

3.1 Description of the Baseline Environment/Context

The proposed development is located at Groody Road, Newcastle, Castletroy, Limerick. The development consisting of 196 no. Bed Clusters, is distributed across 5 no. separate blocks, ranging in height from 5 - 8 storeys, with a total of 1,400 no. student bedspaces and all associated works, as described in the statutory notices.

The subject site is located within the development boundary of Limerick City c. 3.0km west of Limerick City Centre. There is existing residential housing estates located to the east of the proposed site.

The site is not located within a Conservation Area or an Architectural Conservation Area. The topography of the site is generally flat. The development area is located within a zone which includes a number of sources of transportation related air emissions principally Groody Road and Dublin Road West.

3.2 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e., traffic levels). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed.

Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

3.3 Description of Existing Climate

PE-ENV-01104 (TII, 2022c) states that a baseline climate scenario should identify, consistent with the study area for the project, GHG emissions without the project for both the current and future baseline.

Ireland declared a climate and biodiversity emergency in May 2019 and in November 2019 there was European Parliament approval of a resolution declaring a climate and environment emergency in Europe. This, in addition to Ireland's current failure to meet its EU binding targets under Regulation 2018/842 (European Union, 2018) results in changes in GHG emissions either beneficial or adverse being of more significance than previously considered prior to these declarations.

The representative synoptic meteorological station to the subject site is at Shannon Airport which is located approximately 21km west of the site and as such, long-term measurements of wind speed/direction and air temperature for this location are representative of prevailing conditions experienced at the subject site. Recent meteorological data sets for Shannon Airport were obtained from Met Éireann for the purposes of this assessment study.

3.4 Rainfall

Precipitation data from the Shannon Airport meteorological station for the period 2019-2023 indicates a mean annual total of about 1077.5 mm. This is within the expected range for most of the eastern half of the Ireland which has between 750mm and 1000 mm of rainfall in the year.

3.5 Temperature

The annual mean temperature at Shannon Airport (2019-2023) is 11.1°C. Given the relatively close proximity of this meteorological station to the proposed development site, similar conditions would be observed. Table 3.1 sets out meteorological data for Shannon Airport from 2019-2023.

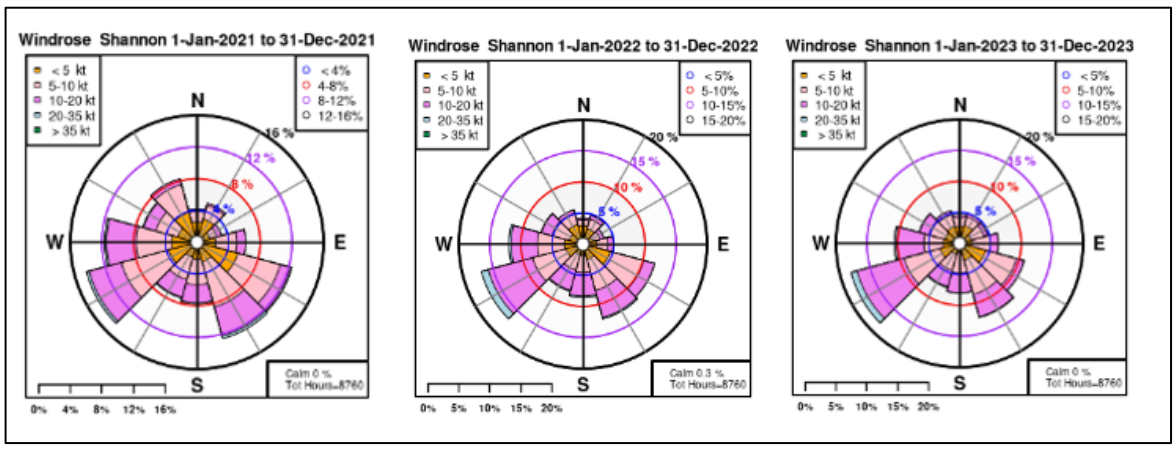
Table 3.1 - Meteorological Data for Shannon Airport 2019-2023

Year	Period	Rainfall (mm)	Mean Temperature (0C)
2019	Annual Mean	1112.0	10.7
2020	Annual Mean	1251.5	10.7
2021	Annual Mean	930.4	11.0
2022	Annual Mean	947.7	11.2
2023	Annual Mean	1146.1	11.7
Mean		**1077.5**	**11.1**

3.6 Wind

Wind is of key importance for both the generation and dispersal of air pollutants. Shannon Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 3.1). For data collated during three representative years (2021 - 2023), the predominant wind direction is westerly to south-westerly with predominately moderate wind speeds.

Figure 3.1- Shannon Airport Windrose 2021, 2022 & 2023



3.7 Description of Existing Air Quality

The existing ambient air quality at and in the vicinity of the site is typical of a city urban location and as such, domestic and commercial heating sources and road traffic are identified as the dominant contributors of hydrocarbon, combustion gases and particulate emissions to ambient air quality.

3.8 Trends in Air Quality

Trends in Annual air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "Air Quality in Ireland 2023– Key Indicators of Ambient Air Quality" details the range and scope of monitoring undertaken throughout Ireland with Limerick City categorised as Zone C.

The most recent 2021 EPA publication includes a number of Zone C monitoring locations which would be broadly comparable to the expected air quality at the subject site. The various Zone C air quality monitoring stations within Ireland provide a comprehensive range of air quality monitoring data sets which have been selected as part of this assessment to describe the existing ambient air quality at the subject site.

3.9 Baseline Air Quality – Review of Available Background Data

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality in Ireland is "*Air Quality in Ireland 2022 – Indicators of Air Quality*" (EPA, 2023). 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, 2020).

In terms of air monitoring and assessment, the proposed development site is within Zone C. The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.) The most recent EPA publication includes a number of monitoring locations in Limerick City which would be broadly comparable to the expected air quality at the subject site. The various air quality monitoring stations within the Limerick City area provides a comprehensive range of air quality monitoring data sets which have been selected as part of this assessment to describe the existing ambient air quality at the subject site.

3.9.1 Description of Existing Air Quality

The existing ambient air quality in the vicinity of the site has been characterised with information obtained from a number of sources as follows:

- Environmental Protection Agency's Annual Air quality in Ireland Report 2023
- Site specific air quality monitoring surveys.

The ambient air quality data collected and reviewed for the purpose of this study focused on the principal substances (dust, vehicle exhaust emissions and boiler emissions) which may be released from the site during the construction and operation phases, and which may exert an influence on local air quality. The existing ambient air quality at and in the vicinity of the site is typical of an urban location and as such, domestic and commercial heating sources and road traffic are identified as the dominant contributors of hydrocarbon, combustion gases and particulate emissions to ambient air quality.

3.9.2 Trends in air quality

Annual air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality 'Air Quality in Ireland 2023' (Published 2024) details the range and scope of monitoring undertaken throughout Ireland. Limerick City Conurbation is categorised as Zone C.

The most recent 2023 EPA publication includes a number of Zone C monitoring locations which would be comparable to the expected air quality at the subject site at Groody Road. The various Zone C air quality monitoring stations within Limerick City provide a comprehensive range of air quality monitoring data sets which have been selected as part of this assessment to describe the existing ambient air quality at the subject site.

3.9.3 Nitrogen Dioxide

The Air Quality Standards Regulations 2011 specify a limit value of 40 µg/m^3, for the protection of human health, over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term NO_2 monitoring was carried out at 2 Limerick City Zone C locations in 2023. The NO_2 annual mean for these sites ranged from 9.0 – 13.5 µg/m^3 compared against the annual average limit of 40 µg/m^3.

3.9.4 Sulphur Dioxide

The Air Quality Standards Regulations 2011 specify an annual limit value of 20µg/m^3 for the protection of human health. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term SO_2 monitoring was carried out at 3 Zone C locations in 2023. The annual SO_2 daily means in 2023 for these sites ranged from 2.1 – 4.5 µg/m^3. No monitoring was carried out in the Limerick City area.

3.9.5 Carbon Monoxide

The Air Quality Standards Regulations 2011 specify an 8-hour limit value (on a rolling basis) for the protection of human health of 10,000 µg/m^3. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term CO monitoring was carried out at 2 Zone C location in 2023. The 8-hour CO concentrations was 300µg/m^3 which is below the 8-hour limit value (on a rolling basis) of 10,000 µg/m^3. No monitoring was carried out in the Limerick City area.

3.9.6 Particulate Matter PM_{10}

The Air Quality Standards Regulations 2011 specify a PM_{10} limit value of 40 µg/m^3 over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term PM_{10} monitoring was carried out at 2 Limerick City Zone C locations in 2023. The PM_{10} annual mean in 2023 for these sites ranged from 11.3 – 11.4µg/m^3.

3.9.7 Particulate Matter PM2.5

The Air Quality Standards Regulations 2011 specify a $PM_{2.5}$ limit value of 25 µg/m^3 over a calendar year.

Long term $PM_{2.5}$ monitoring was carried out at 2 Limerick City Zone C locations in 2023. The $PM_{2.5}$ average in 2023 for these sites ranged from 6.5 – 7.2µg/m^3.

3.9.8 Benzene

The Air Quality Standards Regulations 2011 specify a benzene limit value of 5 µg/m^3 over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011. Long term benzene monitoring was carried out at one Zone D and one Zone A location. The PM_{10} annual mean in 2023 for these sites ranged from 0.2 – 0.6µg/m^3. Therefore, long term averages were below the limit value 5 µg/m^3. No monitoring was carried out in Zone C.

Table 3.2 below presents a summary of the 2023 Air Quality data obtained which may be considered to be broadly similar to that of the subject site in which the subject development site is located.

Table 3.2: Summary of the 2023 Air Quality data obtained from Zone C area.

Pollutant	Regulation	Limit type	Limit value	EPA monitoring data 2023	Average
Nitrogen dioxide	2008/50/EC	Annual limit for protection of human health	40 µg/m^3	9.0 – 13.50µg/m^3	11.25 µg/m^3
Sulphur dioxide	2008/50/EC	Daily limit for protection of human health (not to be exceeded more than 3 times per year)	125 µg/m^3	2.1 – 4. 5µg/m^3	3.3 µg/m^3
Carbon monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health (Zone C)	10,000 µg/m^3	300µg/m^3	5150 µg/m^3
Particulate matter (as PM_{10})	2008/50/EC	Annual limit for protection of human health	40 µg/m^3	11.3 – 11.4µg/m^3	11.35 µg/m^3
Particulate matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3	6.7 – 7.2µg/m^3	6.95 µg/m^3
Benzene	2008/50/EC	Annual limit for protection of human health	5 µg/m^3	0.2 – 0.6µg/m^3	0.4 µg/m^3

Background concentrations for 2026 and 2041 have been calculated. These have used the predicted current background concentrations and the year-on-year reduction factors provided by Transport Infrastructure Ireland in the Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes and the UK Department for Environment, Food and Rural Affairs LAQM.TG.

3.10 Site Specific Baseline air quality monitoring

A site-specific short-term monitoring study was conducted for PM_{10} & $PM_{2.5}$ at the site using DustTrak II Aerosol Monitor 8530. Figure 3.2 identifies the monitoring location. The baseline survey was conducted during March 2024.

This location was chosen in order to obtain representative short-term sample concentrations for the identified parameters.

The survey was indicative only and results obtained cannot be used to demonstrate compliance with short-term or annual limit values detailed in Table 2.1 above. The results are however within the concentration range of EPA long- term air quality data in this zone. The results from the monitoring surveys are presented in Table 3.3.

The concentrations of PM_{10} & $PM_{2.5}$ levels measured during the short-term measurement survey were below their respective annual limit values and comparable with levels reported by the EPA.

Table 3.3: Monitoring Results of PM_{10} & $PM_{2.5}$

Pollutant	Sampling period	Average Measured Concentration	Assessment criteria
PM_{10}	18th March 2024	9.90 µg/m^3	40 µg/m^3 (As annual average)
$PM_{2.5}$	18th March 2024	7.40 µg/m^3	25 µg/m^3 (As annual average)

Figure 3.2: Monitoring Locations for PM_{10} – $PM_{2.5}$

3.10.1 Significance

Based on published 2023 EPA air quality data for the Zone C area in which the subject site is located together with site specific monitoring data, it may be concluded that the existing baseline air quality at the subject site may be characterised as being good with no exceedances of the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) limit values of individual pollutants.

There is therefore currently sufficient atmospheric budget to accommodate the development without adversely impacting existing ambient air quality. The quality of existing air quality at the subject site must be maintained and improved where possible as a result of the proposed development, through sustainable operational approaches, to ensure that local human health and the receiving environment is not adversely affected.

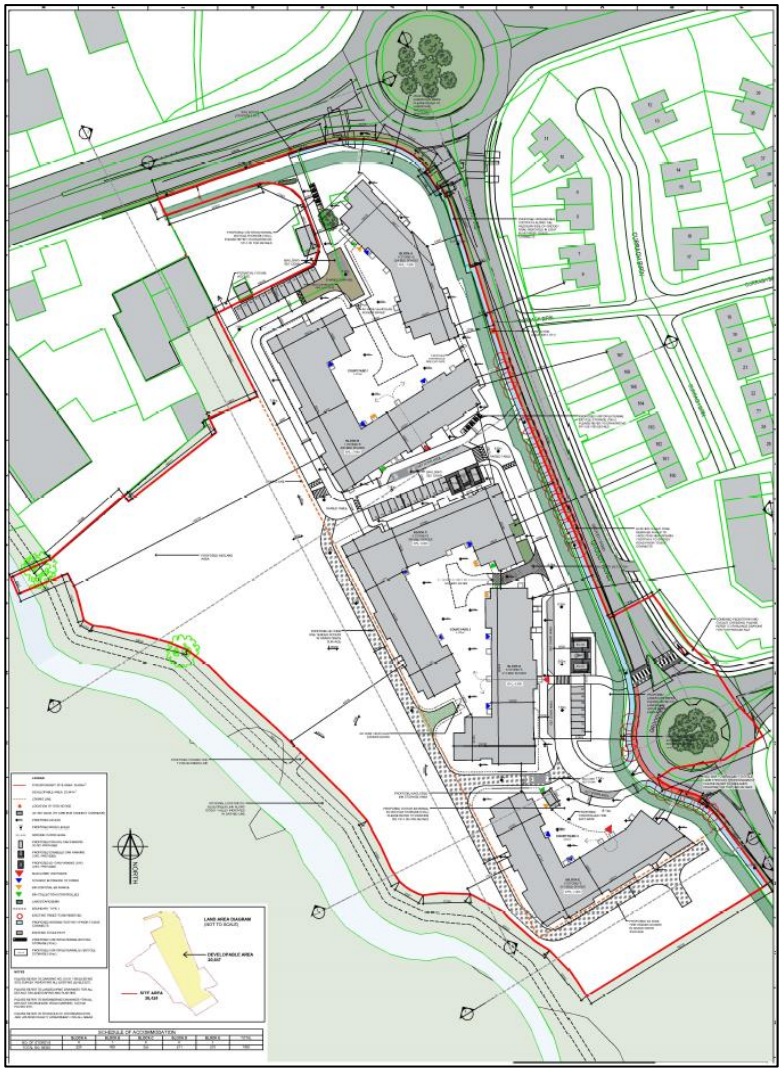
4.0 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The subject site is located within the development boundary of Limerick City c. 3.0km west of Limerick City Centre. There is existing residential housing estates located to the east of the proposed site.

Groody Developments Limited seeks planning permission for the development of a Purpose-Built Student Accommodation (PBSA) scheme on land fronting the Groody Road and Dublin Road, Castletroy, in the townland of Newcastle, Limerick for a period of seven years.

The development consisting of 196 no. Bed Clusters, is distributed across 5 no. separate blocks, ranging in height from 5 - 8 storeys, with a total of 1,400 no. student bedspaces to be delivered in two phases of development including: (i) Block A comprising 8 storeys providing for (a) 28 no. bed clusters and 224 no. bedspaces; (b) Student library; (c) Student union; (d) Plant room; (e) Bin store; (f) Bicycle store; (ii) Block B comprising 7 storeys providing for (a) 52 no. bed clusters and 400 no. bedspaces; (b) Reception & Office; (c) Post room; (d) Laundry room; (e) Student canteen; (f) Maintenance store; (g) Plant room; (h) ESB substation & switch room; (i) Bin Storage; (j) and Bicycle store; (iii) Block C comprising 6 storeys providing for (a) 51 no. bed clusters and 355 no. bedspaces; (b) Student Gym; (c) Maintenance store; (d) Plant room; (e) ESB substation & switch room; (f) Bin Storage; (g) and Bicycle store; (iv) Block D comprising 6 storeys providing for (a) 32 no. bed clusters and 211 no. bedspaces; (b) Reception & Office; (c) Post room; (d) Laundry room; (e) Student canteen; (f) Student supply retail unit (60m2); (g) Plant room; (h) Maintenance store; (i) Bin Storage; and (k) Bicycle Storage; (v) Block E comprising 5 storeys providing for (a) 33 no. bed clusters and 210 no. bedspaces; (b) Reception & Office; (c) Laundry room; (d) Maintenance store; (e) Bicycle store; and (f) Plant room; and (vi) ancillary site development works including car and bicycle parking provision; boundary treatments; roof plant; public lighting; water supply; foul and surface water drainage infrastructure; signage; and a temporary construction access to facilitate Phase 2. Vehicular access to the site will be from the Groody Road with pedestrian access to the Dublin Road. Extensive landscaping proposals, including (a) landscaped courtyards; (b) pedestrian and cycle connections from the Groody Road to the Groody Green Wedge; (c) natural landscaping and public walkways within the Groody Green Wedge; and (d) a Wetland area adjacent to the Groody River are also proposed. Planning permission is also sought for the use of the accommodation, outside of student term time, for short-term letting purposes.

Figure 3.1- Site Layout



When considering a development of this nature, the potential air quality and climate impact on the surroundings must be considered for each of two distinct stages:

A. - Construction phase.
B. - Operational phase.

During the construction stage the main source of air quality impacts will be as a result of fugitive dust emissions from site activities. Emissions from construction vehicles and machinery have the potential to impact climate. The primary sources of air and climatic emissions in the operational context are deemed long term and will involve the change in traffic flows or congestion in the local areas which are associated with the development.

The following describes the primary sources of potential air quality and climate impacts which have been assessed as part of this report.

4.1 Do-Nothing Scenario

The Do-Nothing scenario includes retention of the current site without the proposed residential development in place. In this scenario, 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).

5.0 POTENTIAL IMPACTS

5.1 Construction Impacts

5.1.1 Air Quality

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust and PM_{10}/$PM_{2.5}$ emissions. The proposed development can be considered moderate in scale and therefore there is the potential for significant dust soiling 50m from the source (Table 5.1). While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m.

Potential impacted in the absence of mitigation could cause:

- Potential for loss of life or injury to employees, Contractors, visitors and local residents
- Potential for damage to the environment
- Potential for damage to the facilities, plant and equipment
- Mobilised suspended sediment and cement release through construction activities are the principal potential sources of water quality impact during the construction phase of the works.

Table 5.1 - Assessment Criteria for the Impact of Dust from Construction, with Standard Mitigation in Place

Source		Potential Distance for Significant Effects (Distance from Source)		
Scale	**Description**	**Soiling**	**PM_{10}**	**Vegetation Effects**
Major	Large construction sites, with high use of haul roads	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul roads	50m	15m	15m
Minor	Minor construction sites, with limited use of haul roads	25m	10m	10m

5.1.2 Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO2 and NO2 emissions. However, due to short-term and temporary nature of these works, the impact causes noticeable changes in the character of the environment but without significant consequences.

5.1.3 Human Health

Best practice mitigation measures are proposed for the construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health.

5.2 Operational Phase

5.2.1 Local Air Quality

There is the potential for a number of emissions into the atmosphere during the operational phase of development. In particular, traffic-related air emissions may generate quantities of air pollutants such as NO_2, CO, benzene and PM_{10}. The traffic information was obtained from project Engineers and has been used to model pollutant levels under various traffic scenarios and under sufficient spatial resolution to assess whether any significant air quality

impact on sensitive receptors may occur. Cumulative effects have been assessed, as recommended in the EU Directive on EIA (Council Directive 2014/52/EU).

There are several proposed or permitted developments in the wider area surrounding the proposed development under assessment. These are as follows:

- Bloodmill Road and Groody Road, Towlerton, Ballysimon, Limerick. The development will consist of a new c.19,405sqm hospital over 2 to 4 no. storeys, with plant (c.3,100sqm) at roof level and associated c.504sqm 2no. storey energy centre.

The operational phase of the developments listed above has the potential to generate cumulative impacts on the climate & air quality in the local area. These developments have been considered in the DMRB assessment. The cumulative impact of the proposed development in combination with the surrounding developments has been determined to be imperceptible and long-term following the DMRB assessment. Background concentrations have been included in the modelling study. These background concentrations are year-specific and account for non-localised sources of the pollutants of concern. Appropriate background levels were selected based on the available monitoring data provided by the EPA.

The impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development. The impact of CO, benzene, NO_2, and PM_{10} for the years 2026 and 2041 was predicted at the nearby sensitive receptors to the development. This assessment allows the significance of the development, with respect to both relative and absolute impact, to be determined.

The receptors modelled represent the worst-case locations close to the proposed development and were chosen due to their close proximity (within 200 m) to the road links impacted by proposed development. The worst-case traffic data which satisfied the assessment criteria is shown in Table 5.2 which has a 20% HGV flow. 5 receptors have been identified in the vicinity of the proposed development. Sensitive receptors have been chosen as they have the potential to be adversely impacted by the development, these receptors are shown in Table 5.3 and Figure 5.1.

Table 5.2 1- ADDT - Traffic Data used in Air Modelling Assessment (Base Year 2024)

Link Number	Road Name	Speed (kph)	Do-Nothing		Do-Something	
			2026 Opening Year	2041 Design Year	2026 Opening Year	2041 Design Year
A	Groody Road	50	17,364	20,173	17,451	20,260
B	Dublin Road West	50	28,538	33,177	28,543	33,182
C	Plassey Park Road	50	19,356	22,470	19,434	22,548
D	Dublin Road East	50	19,523	22,653	19,528	22,658

Table 5.3 - Description of Sensitive Receptors

Name	Receptor Type	Coordinates	
		Eastings	Northings
R1	Industrial /Commercial	160675	157175
R2	Residential Housing (Nursing Home)	160830	157338
R3	Residential Housing (Estate)	160860	157170
R4	Industrial /Commercial	160911	157071
R5	Residential Housing (Estate)	160956	156973

Figure 5.1- Approximate Sensitive Receptor Locations used in Modelling Assessment

5.2.2 Modelling Assessment

Transport Infrastructure Ireland Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes detail a methodology for determining air quality impact significance criteria for road schemes and has been adopted for this assessment, as is best practice. The degree of impact is determined based on both the absolute and relative impact 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, in order to determine the degree of impact.

NO_2

The results of the DMRB modelled impact of the proposed development for NO_2 in 2026 and 2041. The annual average concentration is within the limit value at all worst-case receptors. Levels of NO_2 range between 59.10% - 74.18% in 2026 and 59.60% - 77.00% in 2041 of the annual limit value using the annual mean concentrations for the EPA. There are some increases in traffic flows between 2026 and 2041, therefore any reduction in concentrations is due to reduced background concentrations and greater efficiencies predicted in engines.

The impact of the proposed development on annual mean NO_2 levels can be assessed relative to "Do Nothing (DN)" levels in 2026 and 2041. Relative to baseline levels, some imperceptible increases in pollutant levels are predicted as a result of the proposed development. With regard to impacts at individual receptors, the greatest impact on NO_2 concentrations will be an increase of 0.075% of the annual limit value at Receptor 1 & 5. Thus, using the assessment criteria outlined in Appendix 2 Tables A1 – A2, the impact of the proposed development in terms of NO_2 is negligible. Therefore, the overall impact of NO_2 concentrations as a result of the proposed development is long-term and imperceptible at all of the receptors assessed.

PM_{10}

The results of the modelled impact of the proposed development for PM_{10} in 2026 and 2041 are shown in Table 5.5. Predicted annual average concentrations at all receptors in the region of the development range between 30.575% - 31.625 % in 2026 of the limit value. Future trends with the proposed development in place indicate similarly low levels of PM_{10}. PM_{10} concentrations in 2041 range between 30.600% - 31.825% of the limit value.

The impact of the proposed development can be assessed relative to "Do Nothing" levels in 2026 and 2041. Relative to baseline levels, some imperceptible increases in pollutant levels are predicted as a result of the proposed development. With regard to impacts on individual receptors, the greatest impact on PM_{10} concentrations will be an increase of 0.025% of the annual limit value at Receptors 3. Thus, the magnitude of the changes in air quality are negligible at all receptors based on the criteria outlined in Appendix 2, Tables A1 – A3. Therefore, the overall impact of PM_{10} concentrations as a result of the proposed development is long-term and imperceptible.

$PM_{2.5}$

The Air Quality Standards Regulations 2011 specify a $PM_{2.5}$ target value of 25 µg/m^3 over a calendar year to be met by 1 January 2015. Long term $PM_{2.5}$ monitoring was carried out in 2 Limerick City Zone C locations. Based on this EPA data shown in table 3.2, an average background $PM_{2.5}$ concentration in the region of the proposed development is 6.95 µg/m^3. Therefore, long term averages were below the target value 25 µg/m^3.

CO and Benzene

The results of the modelled impact of CO and benzene in the development for 2026 and 2041 are shown in Table 5.7 and Table 5.8 respectively. Predicted pollutant concentrations with the proposed development in place are below the ambient standards at all locations. Levels of CO range between 8.80% - 9.80% in 2026 and between 9.20% - 10.0% in 2041 of the limit value. Levels of benzene ranging between 51.90% - 52.10% in 2026 and 2041 of the total limit value. Future trends indicate similarly low levels of CO and benzene. Levels of both pollutants are below their respective limit values, with CO reaching 10.00% of the limit and benzene reaching 52.10% in 2041.

The impact of the proposed development can be assessed relative to "Do Nothing" levels in 2026 and 2041. CO and benzene concentration from the DMRB Model in both 2026 and 2041 are predicted to be imperceptible. Thus, using the assessment criteria for NO_2 and PM_{10} outlined in Appendix 2 and applying these criteria to CO and benzene, the impact of the proposed development in terms of CO and benzene is negligible, long-term and imperceptible.

Table 5.4 - Annual Mean NO_2 Concentrations (µg/m³)

Receptor	Impact Opening Year (2026)					Impact Design Year (2041)				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	23.75	23.78	0.03	Imperceptible	Negligible	25.15	25.15	0.00	Imperceptible	Negligible
2	29.67	29.67	0.00	Imperceptible	Negligible	30.81	30.81	0.00	Imperceptible	Negligible
3	25.02	25.04	0.02	Imperceptible	Negligible	25.25	25.27	0.02	Imperceptible	Negligible
4	23.64	23.66	0.02	Imperceptible	Negligible	23.84	23.86	0.02	Imperceptible	Negligible
5	27.94	27.97	0.03	Imperceptible	Negligible Increase	28.22	28.25	0.03	Imperceptible	Negligible Increase

Table 5.5- Annual Mean PM_{10} Concentrations (µg/m³)

Receptor	Impact Opening Year (2026)					Impact Design Year (2041)				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	12.24	12.24	0.00	Imperceptible	Negligible	12.33	12.33	0.00	Imperceptible	Negligible
2	12.65	12.65	0.00	Imperceptible	Negligible	12.73	12.73	0.00	Imperceptible	Negligible Increase
3	12.32	12.33	0.01	Imperceptible	Negligible	12.34	12.34	0.00	Imperceptible	Negligible
4	12.23	12.23	0.00	Imperceptible	Negligible	12.24	12.24	0.00	Imperceptible	Negligible
5	12.53	12.53	0.00	Imperceptible	Negligible	12.55	12.55	0.00	Imperceptible	Negligible

Table 5.6- Number of days with PM_{10} concentration > 50 µg/m³

Receptor	Impact Opening Year (2026)		Impact Design Year (2041)	
	DN	DS	DN	DS
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00

Table 5.7- Annual Mean Benzene Concentrations (µg/m³)

Receptor	Impact Opening Year (2026)					Impact Design Year (2041)				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	0.44	0.44	0.00	Imperceptible	Negligible	0.46	0.46	0.00	Imperceptible	Negligible
2	0.49	0.49	0.00	Imperceptible	Negligible	0.50	0.50	0.00	Imperceptible	Negligible
3	0.45	0.45	0.00	Imperceptible	Negligible	0.45	0.45	0.00	Imperceptible	Negligible
4	0.45	0.45	0.00	Imperceptible	Negligible	0.45	0.45	0.00	Imperceptible	Negligible
5	0.46	0.46	0.00	Imperceptible	Negligible	0.47	0.47	0.00	Imperceptible	Negligible

Table 5.8 - Maximum 8-hour CO Concentrations (mg/m³)

Receptor	Impact Opening Year (2026)					Impact Design Year (2041)				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	5.19	5.19	0.00	Imperceptible	Negligible	5.20	5.20	0.00	Imperceptible	Negligible
2	5.21	5.21	0.00	Imperceptible	Negligible	5.21	5.21	0.00	Imperceptible	Negligible
3	5.19	5.20	0.01	Imperceptible	Negligible	5.20	5.20	0.00	Imperceptible	Negligible
4	5.19	5.19	0.00	Imperceptible	Negligible	5.19	5.19	0.00	Imperceptible	Negligible
5	5.20	5.20	0.00	Imperceptible	Negligible	5.21	5.21	0.00	Imperceptible	Negligible

Table 5.9- Regional Air Quality & Climate Assessment

Year	Scenario	CO	NOx	PM_{10}	C
		(kg/annum)	(kg/annum)	(tonnes/annum)	(tonnes/annum)
2026	Do Nothing	46,230	35,891	762	4,107
	Do Something	46,323	35,962	764	4,115
2041	Do Nothing	53,688	41,682	885	4,769
	Do Something	53,781	41,753	887	4,777
Increment in 2026		93 kg	71 Kg	2 tonnes	8 tonnes
Increment in 2041		93 kg	71 kg	2 tonnes	8 tonnes

5.2.3 Summary of Modelling Assessment

Levels of traffic-derived air pollutants for the development will not exceed the ambient air quality standards either with or without the proposed development in place. Using the assessment criteria outlined in Appendix 2, Table A1 – A3, the impact of the development in terms of PM_{10}, CO, NO_2, and benzene is negligible, long-term, and imperceptible.

5.3 Regional Air Quality and Climate Impact

The regional impact of the proposed development on emissions of CO, NOX, PM10 and C has been assessed using the procedures of Transport Infrastructure Ireland. The results (see Table 5.9) show that the likely impact of the proposed development has on the area with the increase traffic flow on the local roads. The likely overall magnitude of the changes on air quality and climate in the operational stage is imperceptible.

5.3.1 Human Health

Air dispersion modelling of operational traffic emissions was undertaken to assess the impact of the development with reference to EU ambient air quality standards which are based on the protection of human health. In terms of the operational stage air quality impacts will predominantly occur as a result of the change in traffic flows in the local areas associated with the proposed development. As demonstrated by the modelling results (Table 5.4 – 5.9), emissions as a result of the proposed development are compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant impact on human health.

6.0 CLIMATE CHANGE

6.1 Construction Phase

A detailed Climate Change Risk Assessment of the construction phase has been scoped out, which states that there are no residual medium or high-risk vulnerabilities to climate change hazards and therefore a detailed CCRA is not required (TII, 2022a). However, consideration has been given to the proposed development's vulnerability to the following climate change hazards with best practice mitigation measures proposed:

- Flood Risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding. The Site-Specific Flood Risk Assessment (SSFRA) carried out for the proposed development by Garland Consulting Engineers concluded that all buildings are located within Flood Zone C and have a minimum finished ground floor level of 7.8m OD. This level is approximately 1m above the 0.1% AEP flood level to allow for freeboard and climate change.
- The development within Flood Zone C which indicates that coastal, fluvial, or pluvial flooding is not a significant risk at the project location. However, best practice mitigation measures are to be implemented.
- Increased temperatures potentially causing drought, wildfires, and prolonged periods of hot weather.
- Reduced temperatures resulting in ice or snow; and
- Major Storm Damage – including wind damage.

6.2 Operational Phase

In order to determine the vulnerability of the proposed development to climate change the sensitivity and exposure of the development to various climate hazards must first be determined. The following climate hazards have been considered in the context of the proposed development: flooding (coastal, pluvial, fluvial), extreme heat, extreme cold, wildfire, drought, extreme wind, lightning, hail, landslides and fog.

The sensitivity of the proposed development to the above climate hazards is assessed irrespective of the project location. Table 2.5 details the sensitivity of the proposed development on a scale of high (3), medium (2) and low (1). Once the sensitivity has been established the exposure of the proposed development to each of the climate hazards is determined, this is the likelihood of the climate hazard occurring at the project location and is also scored on a scale of high (3), medium (2) and low (1). The product of the sensitivity and exposure is then used to determine the overall vulnerability of the proposed development to each of the climate hazards as per Table 2.5. The results of the vulnerability assessment are detailed in Table 6.1.

Table 6.1-Climate Change Vulnerability Assessment

Climate Hazard	Sensitivity	Exposure	Vulnerability
Flooding (Coastal, Pluvial, Fluvial)	1 (Low)	2 (Medium)	2 (Low)
Extreme Heat	1 (Low)	2 (Medium)	2 (Low)
Extreme Cold	1 (Low)	2 (Medium)	2 (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 was determined with reference to a number of online resources and with input from the various discipline specialists on the project team. It was concluded that proposed

development does not have any significant vulnerabilities to the identified climate hazards as described in the below sections. All vulnerabilities are classified as low. There are no residual medium or high-risk vulnerabilities to climate change hazards and therefore a detailed CCRA is not required (TII, 2022a).

Flooding

A Site-Specific Flood Risk Assessment (SSFRA) for the proposed development was undertaken by Garland Consulting Engineers and is submitted with this planning application. The SSFRA concluded that the site is considered to be within Flood Zone C. All buildings are located within Flood Zone C and have a minimum finished ground floor level of 7.8m OD. This level is approximately 1m above the 0.1% AEP flood level to allow for freeboard and climate change. The Electrical Substation if required will be built outside of the Flood Zone A& B areas and at a level of 7.8m OD. In the event of emergency, all buildings can be accessed from roads above the 0.1% AEP flood level. The surface water discharge from the site is limited to the existing greenfield run-off to prevent downstream flooding. The surface water outfall from the site will contain a non-return valve. There is no basement construction proposed for the development.

Extreme Wind, Fog, Lightning & Hail

In relation to extreme winds, the buildings shall be designed to the appropriate standards to account for the relevant wind loadings. If required as part of the building design, lightning protection shall be provided for. Hail and fog are not predicted to significantly affect the buildings due to their design.

Wildfires

In relation to wildfires, the Think Hazard! tool developed by the Global Facility for Disaster Reduction and Recovery (GFDRR, 2023), indicates that the wildfire hazard is classified as low for the Limerick area. This means that there is between 4% to 10% chance of experiencing weather that could support a problematic wildfire in the project area that may cause disruptions and low but tangible risk of life and property loss in any given year. Future climate modelling indicates that there could be an increase in the weather conditions which are favourable to fire conditions, these include increases in temperature and prolonged dry periods. However, due to the project location in a suburban area the risk of wildfire is significantly lessened, and it can be concluded that the proposed development is of low vulnerability to wildfires.

Landslides

Landslide susceptibility mapping developed by Geological Survey Ireland (GSI, 2024) indicates that the proposed development location is not within an area that is susceptible to landslides and there are no recorded historical landslide events at the project location. It can be concluded that landslides are not a risk to the proposed development site.

Extreme Temperatures (Heat & Cold) & Drought

In relation to extreme temperatures, both extreme heat and extreme cold, these have the potential to impact the building materials and some related infrastructure. However, the building materials selected at the detailed design stage will be of high quality and durability. Therefore, extreme temperatures are not considered a significant risk.

In relation to drought, planting material for the proposed development landscaping is typical of the locality and is generally tolerant of climatic zones which experience variable warmer and cooler conditions. Therefore, the sensitivity to drought is considered low and the vulnerability is also low.

Summary

Overall, the proposed development has at most low vulnerabilities to the identified climate hazards.
Therefore, no detailed risk assessment is required.

7.0 POTENTIAL CUMULATIVE IMPACTS

In accordance with The Planning and Development Regulations 2001 as amended, this section has considered the cumulative impact of the proposed development in conjunction with future and current development in the vicinity of the subject site. This section relates to the cumulative impact on the subject site itself and on surrounding sites.

The European Commission's report of May 1999 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' defines cumulative impact as follows:

"Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project."

The cumulative air quality impact of the existing residential development, under construction developments and existing local transport infrastructure together with the proposed development is assessed with regard to having established the baseline air quality and then predicting the impact that the proposed development will have on the baseline air quality. Together the combined impact can be assessed to determine if there is sufficient "atmospheric capacity" to facilitate the proposed development.

It is predicted that the cumulative impact of the construction and operational phases of the proposed development and proposed or permitted neighboring developments will not have an adverse long-term impact on the receiving environment.

It is considered that there will be the potential for a short term slight negative cumulative impact associated with the construction phase of the subject development on ambient air quality and climate primarily as a result of the use of diesel to fuel construction plant and equipment. However, through the implementation of the mitigation measures and the integration into the design of the operational development of sustainable aspects and energy reduction features will ensure the receiving environment including off site residential receptors and existing habitats will not be adversely impacted.

8.0 MITIGATION MEASURES

8.1 Construction phase

8.1.1 Air Quality

The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the dust management plan. The key aspects of controlling dust are listed below. Full details of the dust minimisation plan can be found in Appendix 3.

- The specification and circulation of a dust management plan for the site and the identification of persons responsible for managing dust control and any potential issues;
- The development of a documented system for managing site practices with regard to dust control
- The development of a means by which the performance of the dust management plan can be monitored and assessed;
- The specification of effective measures to deal with any complaints received.

At all times, the procedures within the plan will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations. The proceduses to rectify the problems are set out in appendix 3 (Dust Managament Plan).

Dust nuisance is defined when air quality standards relating to dust deposition and PM10 are exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented.

In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a Dust Management Plan (see appendix 3). Provided the dust management measures outlined in the plan (see Appendix 3) are adhered to, the air quality impacts during the construction phase will not be significant. Regard has also been taken for the import of infill materials from off-site locations and potential dust impacts as a result of this will also be mitigated minimusing any effects on the local air quality or local micro/macro climate.

8.1.2 Mitigation Measures (Construction)

- Use of rubble chutes and receptor skips during construction activities.
- During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water and wetting agents.
- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un- surfaced roads will be restricted to essential site traffic only.
- Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper.
- The overloading of tipper trucks exiting the site will not be permitted. Aggregates will be transported to and from the site in covered trucks.
- Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser.
- Wetting agents shall be utilised to provide a more effective surface wetting procedure.
- Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels.
- All plant not in operation shall be turned off and idling engines shall not be permitted for excessive

periods. Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

- Material stockpiles containing fine or dusty elements including soils shall be covered with tarpaulins. Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM_{10} are not exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented.
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.
- Dust netting and site hoarding shall be installed along the north, south, east, and western site boundaries to minimise the propagation of fugitive windblown dust emissions falling on third party lands and existing residential areas.
- Over use of Low emission construction practices.

Table 8.1 presents a summary of dust control techniques which will be implemented at the site during construction activities.

Table 8.1- summary of dust control techniques

SUMMARY OF DUST CONTROL TECHNIQUES	
Sources of Particular Matter	**Control Technique**
Loading and unloading processes	**Containment / Suppression**
	Reducing drop heights
	Use of variable height conveyors
	Use of chutes
Double handling transfers points	**Site and process design**
	Reduction of vehicle movements
Aggregate stockpiles	**Appropriate siting**
	Away from closest receptors/site boundaries
	Use of enclosures and bunding
	Reduced drop heights
	Water suppression
	Sprays
	Bowsers
	Covering
	Covered stock bins
	Dust covers
Mobile Crushing of site generated C&D Waste (if applicable)	**Appropriate siting**
	Away from closest receptors/site boundaries
	Use of enclosures and bunding
	Reduced drop heights
	Water suppression
	Sprays
	Bowsers
Conveyors / transfer points	**Containment**
	Wind boards
	Housings
	Suppression
	Water sprays
	Housekeeping
	Clean up of spilled materials
	Appropriate siting
	Away from closest receptors/site boundaries
Concrete Cutting Plant	**Suppression**
	Water sprays fitted to equipment/plant
Roadways including the site yard area.	**Suppression**
	Water sprays and bowsers
	Wheel wash at site compounds
Vehicles	**Washing / Covering**
	Wheel wash to be installed at site exit
	Vehicles exiting the site with C&D loads shall be covered with tarpaulin

8.2 Operational Phase

The Operational Phase of the Groody Road LRD will not generate air emissions that would have an adverse impact on local ambient air quality or local human health. The operational phase includes mitigation by design of the development to minimise the impact of the operational phase of the development on air quality and climate are as follows:

8.2.1 Climate Impact Mitigation Measures by Design

- Energy Efficiency All residential units shall be designed and constructed in accordance with The Irish Building Regulations Technical Guidance Document L Conservation of Fuel & Energy Dwellings includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by December 2020.
- As per the Energy Report prepared by JOT Energy Consultants "The proposed complex will comply with the existing requirements of Part L 2022/ NZEB with sufficient leeway to accommodate changes not detailed at this time, and with opportunities for individual owners to add further energy-saving or renewable- energy measures, e.g. heat-recovery systems and additional photovoltaic or solar thermal panels".

8.3 Climate Change Mitigation

8.3.1 Construction Phase Mitigation

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. During the construction phase the following best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts on climate:

- Creating a construction program which allows for sufficient time to determine reuse and recycling opportunities for construction wastes.
- Appointing a suitably competent contractor who will undertake a pre-construction audit detailing resource recovery best practice and identify materials/building components that can be reused/recycled.
- Materials will be reused on site where possible.
- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.
- Ensure all plant and machinery are well maintained and inspected regularly.
- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.
- Material choices and quantities will be reviewed during detailed design, to identify and implement lower embodied carbon options where feasible.
- Sourcing materials locally where possible to reduce transport related CO2 emissions; and
- The project shall review and determine compliance with the requirements set out in the EU Taxonomy Regulation (Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (Text with EEA relevance)) in relation to circular economy. This is specific to reuse, recycling, and material recovery of construction wastes.

In terms of impact on the proposed development due to climate change, during construction the Contractor will be required to mitigate against the effects of extreme rainfall/flooding through site risk assessments and method statements. The Contractor will also be required to mitigate against the effects of extreme wind/storms, temperature extremes through site risk assessments and method statements. All materials used during

construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, and this will require consideration during construction. During construction, the Contractor will be required to mitigate against the effects of fog, lighting and hail through site risk assessments and method statements.

8.3.2 Operational Phase Mitigation

As per the *Energy Statement* (JOT Energy Consultants, 2024) with this planning application) the development will be a Nearly Zero Energy Building (NZEB) in accordance with the Building Regulations Technical Guidance Document L 2021 and the relevant sustainability policies within the Limerick City and Council Development Plan. The report details a number of 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 of climate from energy usage are:

- The residential units will aim to achieve a Building Energy Ratio (BER) of A2 (25-50 kwh/m^2/yr with CO_2 emissions <10 kg CO_2/m^2 per year).
- Achieve air tightness standards of 3 m^3/m^2/hr.
- Ensure thermal bridging details are designed to achieve thermal bridging factors of 0.08W/m^2K (0.15 W/m^2k required in Part L).
- Energy Performance Coefficient (EPC) < 0.30.
- Carbon Performance Coefficient (CPC) < 0.35.
- Renewable Energy Ratio (RER) > 0.20.
- Meet or exceed minimum U-Value standards identified in Part L 2022 Dwellings.
- A combination of low energy strategies such as air to water heat pumps, mechanical ventilation heat recovery and/or natural ventilation will be decided and implemented to achieve A2 BER Rating.
- Provide an appropriate combination of technologies to ensure energy consumption is in line with Part L 2022 Dwellings requirements.
- Use of natural daylight will be maximised to reduce the need for artificial lighting.

The above measures will assist in optimising the energy consumed by the development and will also have the benefit of reducing the impact to climate during the operational phase of the development. Some measures have been incorporated into the design of the development to mitigate the impacts of future climate change. For example, adequate attenuation and drainage have been incorporated to avoid potential flooding impacts due to increased rainfall events in future years. These measures have been considered when assessing the vulnerability of the proposed development to climate.

9.0 INDIRECT AND / OR SECONDARY IMPACTS

The direct impacts on climate have been assessed. There are no additional indirect and/or secondary impacts on climate which are not a direct result of the proposed development, often produced away from (the site) or as a result of a complex pathway (EPA, 2022).

10.0 RISK OF MAJOR ACCIDENTS OR DISASTERS

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. However, the potential for flooding on site has been reviewed and adequate attenuation and drainage have been provided for to account for increased rainfall in future years. The proposed development has been assessed as having only low vulnerabilities to various climate change related hazards and there is no significant risk to the site as a result of climate change. Therefore, the impact will be *neutral* and *imperceptible*.

11.0 MONITORING & REINSTATEMENT

11.1 Monitoring

Monitoring of construction and dust deposition at nearby sensitive receptors (residential dwellings) during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/(m2*day) during the monitoring period between 28 – 32 days.

There is no monitoring recommended for the operational phase of the development as impacts to air quality and climate are predicted to be imperceptible.

12.0 RESIDUAL IMPACTS

12.1 Construction Phase

12.1.1 Air Quality

When the dust minimisation measures detailed in the mitigation section of this report are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors.

The development of the site will be conducted in the following phased stages:

- Enabling works - Site set up and Site clearance.
- Construction works including site infrastructure, apartments, commercial buildings, and landscaping.

Construction impacts/effects associated with both of these phased stages are considered below.

Enabling works - Site Set Up and Clearance

Works activities associated with the 'Site set up' will be undertaken prior to construction works commencing in each sub-phase. The setting up of the site shall involve the construction of site security hoarding and site compounds, site offices, materials and waste storage areas and staff welfare facilities. These temporary activities will have a minimal potential to generate fugitive dust emissions or combustion gas emissions.

Site clearance, building and ground excavation works will be undertaken in separate phases and these activities have the potential to generate fugitive windblown dust emissions rising from the operation of mechanical plant such as excavators and tipper trucks and the movement of these vehicles on exposed surfaces at the site. Infrastructural works will be required to facilitate site services.

With regard to the volume of waste material (sub soils) generated during site clearance, there will be a requirement for HGV trucks to remove the material from the site. Stripped soils shall be stockpiled and covered on site for re-use during final landscaping works. Trucks shall be loaded with material on-site by mechanical excavators and loading shovels which will generate fugitive dust emissions as a result of the transfer of the excavated materials comprised principally of soils and stones from stockpile to truck.

The movements of construction vehicles on the site shall also generate windblown dust emissions. Where dusty waste material is loaded onto exposed open trucks, fine dusts may be released as the truck travels along public roads.

Building and Site Infrastructure Construction Works

During the construction phase there will be extensive site works, involving construction machinery and activities which have the potential to generate fugitive windblown dust emissions. Construction equipment including generators and compressors will also give rise to diesel and petrol engine exhaust emissions.

Construction traffic to and from the site shall result in a short-term increase in the volume of diesel HGVs along the local road network which will generate additional hydrocarbon and particulate emissions from the vehicle exhausts. During the construction phase CO_2 will be released into the atmosphere as a result of the movement of construction vehicles and the use of construction plant including generators and cranes.

12.1.2 Climate

The overall development includes the construction of buildings which may have the potential effect of marginally raising localised air temperatures, especially in summer.

12.2 Operational Phase

Various elements associated with the construction phase of the proposed development have the potential to impact local ambient air quality, however the potential construction phase impacts shall be mitigated as detailed above to ensure there is a minimal impact on ambient air quality for the duration of all construction phase works. It is predicted that the operational phase of the development will not generate air emissions that would have an adverse impact on local ambient air quality or local human health. Air emissions can be futher reduced by using operational mitigation measures and detailed above.

The results of the air dispersion modelling study indicate that the impacts of the proposed development on air quality and climate is predicted to be imperceptible with respect to the operational phase for the long and short term.

12.2.1 Air quality

The operational phase of the proposed development has the potential to have a slight, long-term impact on local air quality as a result of the requirements for new buildings to be heated and with the increased traffic movements associated with the development.

12.2.2 Climate

The proposed development includes apartment structures which may impact on the local micro-climate by means of wind shear effects. With a minimal parking provision of only 40no. parking spaces, the proposed development will generate negligible traffic flows in the order of less than 10no. private car trips during peak hours and will therefore have a negligible, near zero traffic impact on the local road network and junctions.

13.0 CONCLUSION

Traynor Environmental Ltd was commissioned by Groody Developments Limited to undertake an Air Quality and Climate Impact Assessment Report in support of a planning application for the proposed Whitebox Student Campus development on land at Groody Road, Newcastle, Castletroy, Limerick.

The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the site during operation. As such, an Air Quality Assessment was required in order to determine baseline conditions and assess potential effects as a result of the scheme.

During the construction phase of the development there is the potential for air quality impacts as a result of fugitive dust emissions from the site. These were assessed in accordance with the general assessment methodology. Assuming good practice dust control measures are implemented, the residual significance of potential air quality impacts from dust generated by earthworks, construction activities was predicted to be slight - imperceptible.

Potential impacts during the operational phase of the proposals may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site and the development itself. Review of published EPA air quality data for the Zone C area and site-specific monitoring data was therefore undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the development. Review of the operational phase was predicted to be imperceptible.

Based on the assessment results, air quality factors are not considered a constraint to the development.

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APPENDIX - 1

AMBIENT AIR QUALITY STANDARDS

Ambient Air Quality Standards

National standards for ambient air pollutants in Ireland have generally ensued from Council Directives enacted in the EU (& previously the EC & EEC). The initial interest in ambient air pollution legislation in the EU dates from the early 1980s and was in response to the most serious pollutant problems at that time which was the issue of acid rain. As a result of this sulphur dioxide, and later nitrogen dioxide, were both the focus of EU legislation. Linked to the acid rain problem was urban smog associated with fuel burning for space heating purposes. Also apparent at this time were the problems caused by leaded petrol and EU legislation was introduced to deal with this problem in the early 1980s.

In recent years, the EU has focused on defining a basis strategy across the EU in relation to ambient air quality. In 1996, a Framework Directive, Council Directive 96/62/EC, on ambient air quality assessment and management was enacted. The aims of the Directive are fourfold. Firstly, the Directive's aim is to establish objectives for ambient air quality designed to avoid harmful effects to health. Secondly, the Directive aims to assess ambient air quality on the basis of common methods and criteria throughout the EU. Additionally, it is aimed to make information on air quality available to the public via alert thresholds and fourthly, it aims to maintain air quality where it is good and improve it in other cases.

As part of these measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, Council Directive 1999/30/EC, has been passed into Irish Law as S.I. No 271 of 2002 (Air Quality Standards Regulations 2002) and has set limit values which came into operation on 17th June 2002. The Air Quality Standards Regulations 2002 detail margins of tolerance, which are trigger levels for certain types of action in the period leading to the attainment date.

The margin of tolerance varies from 60% for lead, to 30% for 24-hour limit value for PM_{10}, 40% for the hourly and annual limit value for NO_2 and 26% for hourly SO_2 limit values. The margin of tolerance commenced from June 2002 and started to reduce from 1st January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by the attainment date. A second daughter directive, EU Council Directive 2000/69/EC, has published limit values for both carbon monoxide and benzene in ambient air. This has also been passed into Irish Law under the Air Quality Standards Regulations 2002.

The most recent EU Council Directive on ambient air quality was published on the 11/06/08 which has been transposed into Irish Law as S.I. 180 of 2011. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive and its subsequent daughter directives. Provisions were also made for the inclusion of new ambient limit values relating to $PM_{2.5}$. The margins of tolerance specific to each pollutant were also slightly adjusted from previous directives. In regard to existing ambient air quality standards, it is not proposed to modify the standards but to strengthen existing provisions to ensure that non-compliances are removed. In addition, new ambient standards for $PM_{2.5}$ are included in Directive 2008/50/EC.

The approach for $PM_{2.5}$ was to establish a target value of 25 µg/m^3, as an annual average (to be attained everywhere by 2010) and a limit value of 25 µg/m^3, as an annual average (to be attained everywhere by 2015), coupled with a target to reduce human exposure generally to $PM_{2.5}$ between 2010 and 2020. This exposure reduction target will range from 0% (for $PM_{2.5}$ concentrations of less than 8.5 µg/m^3 to 20% of the average exposure indicator (AEI) for concentrations of between 18 - 22 µg/m^3). Where the AEI is currently greater than 22 µg/m^3 all appropriate measures should be employed to reduce this level to 18 µg/m^3 by 2020. The AEI is based on measurements taken in urban background locations averaged over a three-year period from 2008 - 2010 and

again from 2018-2020. Additionally, an exposure concentration obligation of 20 µg/m^3 was set to be complied with by 2015 again based on the AEI.

Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions. The Alert Threshold is defined in Council Directive 96/62/EC as "a level beyond which there is a risk to human health from brief exposure and at which immediate steps shall be taken as laid down in Directive 96/62/EC". These steps include undertaking to ensure that the necessary steps are taken to inform the public (e.g. by means of radio, television, and the press).

The Margin of Tolerance is defined in Council Directive 96/62/EC as a concentration which is higher than the limit value when legislation comes into force. It decreases to meet the limit value by the attainment date. The Upper Assessment Threshold is defined in Council Directive 96/62/EC as a concentration above which high quality measurement is mandatory. Data from measurement may be supplemented by information from other sources, including air quality modelling.

An annual average limit for both NO_X (NO and NO_2) is applicable for the protection of vegetation in highly rural areas away from major sources of NO_X such as large conurbations, factories, and high road vehicle activity such as a dual carriageway or motorway. Annex VI of EU Directive 1999/30/EC identifies that monitoring to demonstrate compliance with the NOX limit for the protection of vegetation should be carried out distances greater than:

- 5 km from the nearest motorway or dual carriageway
- 5 km from the nearest major industrial installation
- 20 km from a major urban conurbation

As a guideline, a monitoring station should be indicative of approximately 1000 km^2 of surrounding area.

Under the terms of EU Framework Directive on Ambient Air Quality (96/62/EC), geographical areas within member states have been classified in terms of zones. The zones have been defined in order to meet the criteria for air quality monitoring, assessment, and management as described in the Framework Directive and Daughter Directives. Zone A is defined as Dublin and its environs, Zone B is defined as Cork City, Zone C is defined as 23 urban areas with a population greater than 15,000 and Zone D is defined as the remainder of the country. The Zones were defined based on among other things, population, and existing ambient air quality.

EU Council Directive 96/62/EC on ambient air quality and assessment has been adopted into Irish Legislation (S.I. No. 33 of 1999). The act has designated the Environmental Protection Agency (EPA) as the competent authority responsible for the implementation of the Directive and for assessing ambient air quality in the State. Other commonly referenced ambient air quality standards include the World Health Organisation. The WHO guidelines differ from air quality standards in that they are primarily set to protect public health from the effects of air pollution. Air quality standards, however, are air quality guidelines recommended by governments, for which additional factors, such as socio-economic factors, may be considered.

Air Dispersion Modelling

The inputs to the DMRB model consist of information on road layouts, receptor locations, annual average daily traffic movements, annual average traffic speeds and background concentrations. Using this input data, the model predicts ambient ground level concentrations at the worst-case sensitive receptor using generic meteorological data.

The DMR B has recently undergone an extensive validation exercise as part of the UK's Review and Assessment Process to designate areas as Air Quality Management Areas (AQMAs). The validation exercise was carried out

at 12 monitoring sites within the UK DEFRAs national air quality monitoring network. The validation exercise was carried out for NO_X, NO_2 and PM_{10}, and included urban background and kerbside/roadside locations, "open" and "confined" settings and a variety of geographical locations.

In relation to NO_2, the model generally over-predicts concentrations, with a greater degree of over-prediction at "open" site locations. The performance of the model with respect to NO_2 mirrors that of NO_X showing that the over-prediction is due to NO_X calculations rather than the NO_X:NO_2 conversion. Within most urban situations, the model overestimates annual mean NO_2 concentrations by between 0 to 40% at confined locations and by 20 to 60% at open locations. The performance is considered comparable with that of sophisticated dispersion models when applied to situations where specific local validation corrections have not been carried out. The model also tends to over-predict PM_{10}. Within most urban situations, the model will over-estimate annual mean PM_{10} concentrations by between 20 to 40%. The performance is comparable to more sophisticated models, which, if not validated locally, can be expected to predict concentrations within the range of 50%. Thus, the validation exercise has confirmed that the model is a useful screening tool for the Second Stage Review and Assessment, for which a conservative approach is applicable.

APPENDIX - 2

TRANSPORT INFRASTRUCTURE IRELAND SIGNIFICANCE CRITERIA

Magnitude of Change	Annual Mean NO_2 / PM_{10}	Annual Mean $PM_{2.5}$
Large	Increase / decrease ≥4 µg/m³	Increase / decrease ≥2.5 µg/m³
Medium	Increase / decrease 2 - <4 µg/m³	Increase / decrease 1.25 - <2.5 µg/m³
Small	Increase / decrease 0.4 - <2 µg/m³	Increase / decrease 0.25 - <1.25 µg/m³
Imperceptible	Increase / decrease <0.4 µg/m³	Increase / decrease <0.25

Table A1: Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration Note 1		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value with Scheme (≥40 µg/m³ of NO_2 or PM_{10}) (≥25 µg/m³ of $PM_{2.5}$)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with Scheme (36 - <40 µg/m³ of NO_2 or PM_{10}) (22.5 - <25 µg/m3 of $PM_{2.5}$)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with Scheme (30 - <36 µg/m³ of NO_2 or PM_{10}) (18.75 - <22.5 µg/m³ of $PM_{2.5}$)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with Scheme (<30 µg/m³ of NO_2 or PM_{10}) (<18.75 µg/m³ of $PM_{2.5}$)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value with Scheme (≥40 µg/m³ of NO_2 or PM_{10}) (≥25 µg/m³ of $PM_{2.5}$)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value with Scheme (36 - <40 µg/m³ of NO_2 or PM_{10}) (22.5 - <25 µg/m³ of $PM_{2.5}$)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value with Scheme (30 - <36 µg/m³ of NO_2 or PM_{10}) (18.75 - <22.5 µg/m³ of $PM_{2.5}$)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value with Scheme (<30 µg/m³ of NO_2 or PM_{10}) (<18.75 µg/m³ of $PM_{2.5}$)	Negligible	Negligible	Slight Beneficial

Note 1 *Well Below Standard = <75% of limit value.*

Table A2: Air Quality Impact Significance Criteria for Annual Mean NO_2 and PM_{10} and $PM_{2.5}$ Concentrations at a Receptor

	Change in Concentration Note 1

Absolute Concentration in Relation to Objective/Limit Value	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value with Scheme (≥35 days)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with Scheme (32 - <35 days)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with Scheme (26 - <32 days)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with Scheme (<26 days)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value with Scheme (≥35 days)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value with Scheme (32 - <35 days)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value with Scheme (26 - <32 days)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value with Scheme (<26 days)	Negligible	Negligible	Slight Beneficial

Note 1 *Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible*

Table A3: Air Quality Impact Significance Criteria for Changes to Number of Days with PM_{10} Concentration Greater than 50 µg/m³ at a Receptor

APPENDIX - 3
DUST MINIMISATION PLAN

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland and the United Kingdom.

Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance. As the prevailing wind is predominantly south-westerly, locating construction compounds and storage piles downwind of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed. The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials. Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions is highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur.

The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented, and that dust impacts and nuisance are minimised.
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions.
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details.
- It is recommended that community engagement be undertaken before work commences on site explaining the nature and duration of the work to local residents and businesses.
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out.
- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented, and that dust impacts and nuisance are minimised.
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions.

- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details.
- It is recommended that community engagement be undertaken before work commences on site explaining the nature and duration of the work to local residents and businesses.
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out.
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein.
- At all times, the procedures put in place will be strictly monitored and assessed.

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

Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80%.

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads.
- Access gates to the site shall be located at least 10m from sensitive receptors where possible.
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50%. Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use.
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust.
- During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided.

Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors.

- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency.
- Where feasible, hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

Site Traffic on Public Roads

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

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust.
- At the main site traffic exits, a wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned, as necessary.

Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues.
- The development of a documented system for managing site practices with regard to dust control.
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.