REPORT



Air Quality Assessment

Royal Liver Creche

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TABLE OF CONTENTS

1. INTRODUCTION 1

2. METHODOLOGY 2
   2.1 Assessment Criteria 2
      2.1.1 Ambient Air Quality Standards 2
   2.2 Methodology – Air Quality Assessment of Traffic Emissions 3
      2.2.1 Modelling Scenarios 4
      2.2.2 Model Inputs 4
      2.2.3 Traffic Data used in Modelling Assessment 4

3. BASELINE AIR QUALITY 5
      3.1.1 Baseline Pollutant Concentrations - NO_2, PM_{10}, $PM_{2.5}$ 5
      3.1.2 Future Background Concentrations Projections 6

4. AIR QUALITY ASSESSMENT 6

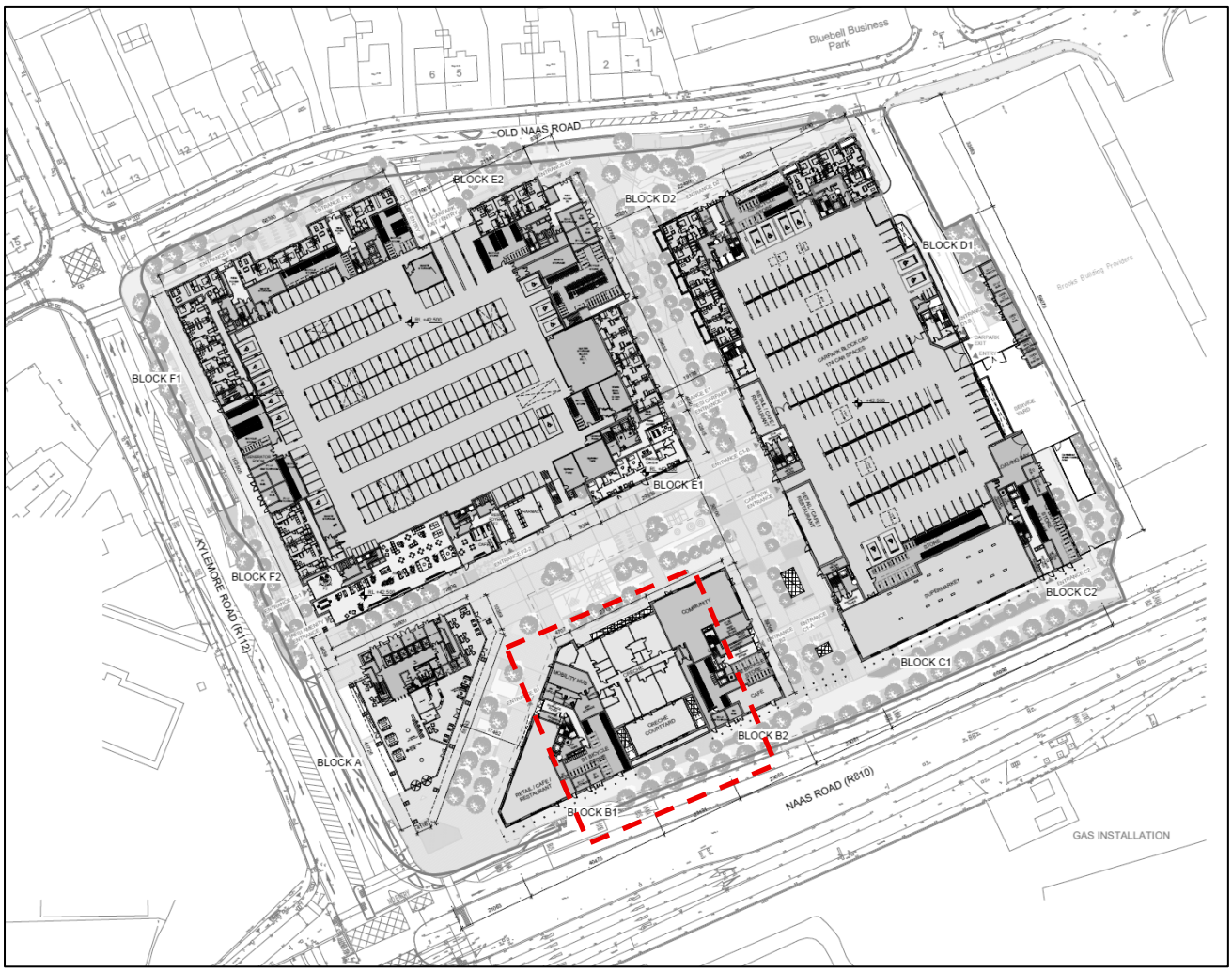
5. CONCLUSION 7

6. REFERENCES 7

1. INTRODUCTION

AWN Consulting, a Trinity Consultants Company, has been commissioned to undertake an air quality assessment relating to the proposed creche for the Royal Liver Project (the 'development'). The creche is located adjacent to the R810 Naas Road, this report assesses the potential air quality impacts from traffic emissions within the outdoor courtyard area of the creche. The location of the proposed creche is shown in Figure 1.

Figure 1. Location of Proposed Creche



This report includes:

- A description of the methodology used in the assessment.
- A discussion on the existing baseline levels of air pollutants.
- Modelling of operational traffic emissions for the existing baseline, opening and design years for the development.
- Discussion on whether the predicted pollutant concentrations are likely to cause significant impacts to air quality and human health.

2. METHODOLOGY

The air quality assessment of traffic emissions has been undertaken based on guidance from Transport Infrastructure Ireland (TII), specifically, *PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects* (TII, 2025). While the guidance is specific to infrastructure projects, the approach can be applied to traffic assessments for any development type as the principles are the same.

2.1 Assessment Criteria

2.1.1 Ambient Air Quality Standards

National and European statutory bodies, the Department of the Environment, Heritage and Local Government in Ireland and the European Parliament and Council of the European Union, have set limit values in ambient air for a range of air pollutants to reduce the risk to health from poor air quality. 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 on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland are set out in Directive (EU) 2024/2881 *of the European Parliament and of the Council of 23 October 2024 on ambient air quality and cleaner air for Europe (recast)*. This directive supersedes EU Directive 2008/50/EC *of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe* (CAFE Directive). It sets out air quality standards for pollutants to be reached by 2026 and by 2030.

The Ambient Air Quality Standards Regulations 2022 (S.I. 739 of 2022) (the Air Quality Standards Regulations 2022) further transposed the CAFE Directive and revoked the Air Quality Standards Regulations 2011, as amended. With the adoption of Directive (EU) 2024/2881, Ireland must similarly transpose this directive into national law within the statutory two-year period, i.e. update the Air Quality Standards Regulations, before December 2026.

The ambient air quality limit values for pollutants are set out in Annex I of Directive (EU) 2024/2881. Table 1 of Annex I in Directive (EU) 2024/2881 sets out the updated air quality limit values for pollutants to be achieved by 1 January 2030, these are more closely aligned with the Interim Target 4 in the 2021 WHO air quality guidelines. Table 2 of Annex I in Directive (EU) 2024/2881 sets out the limit values for air pollutants which are to be achieved by 11 December 2026 and are also applicable up to 2030. The limit values in Table 2 of Annex I are the same as the limits set under Directive 2008/50/EC and the Air Quality Standards Regulations 2022.

In relation to the development, the applicable limit values are for nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). Table 1 outlines the limit values for the specified pollutants. For the purposes of this assessment the post-2030 limit values set out in Table 1 of Annex I of Directive (EU) 2024/2881 have been applied. This is in line with the TII PE-ENV-01106 guidance (2025) and ensures a conservative approach to the assessment.

Table 1. Air Quality Limit Values

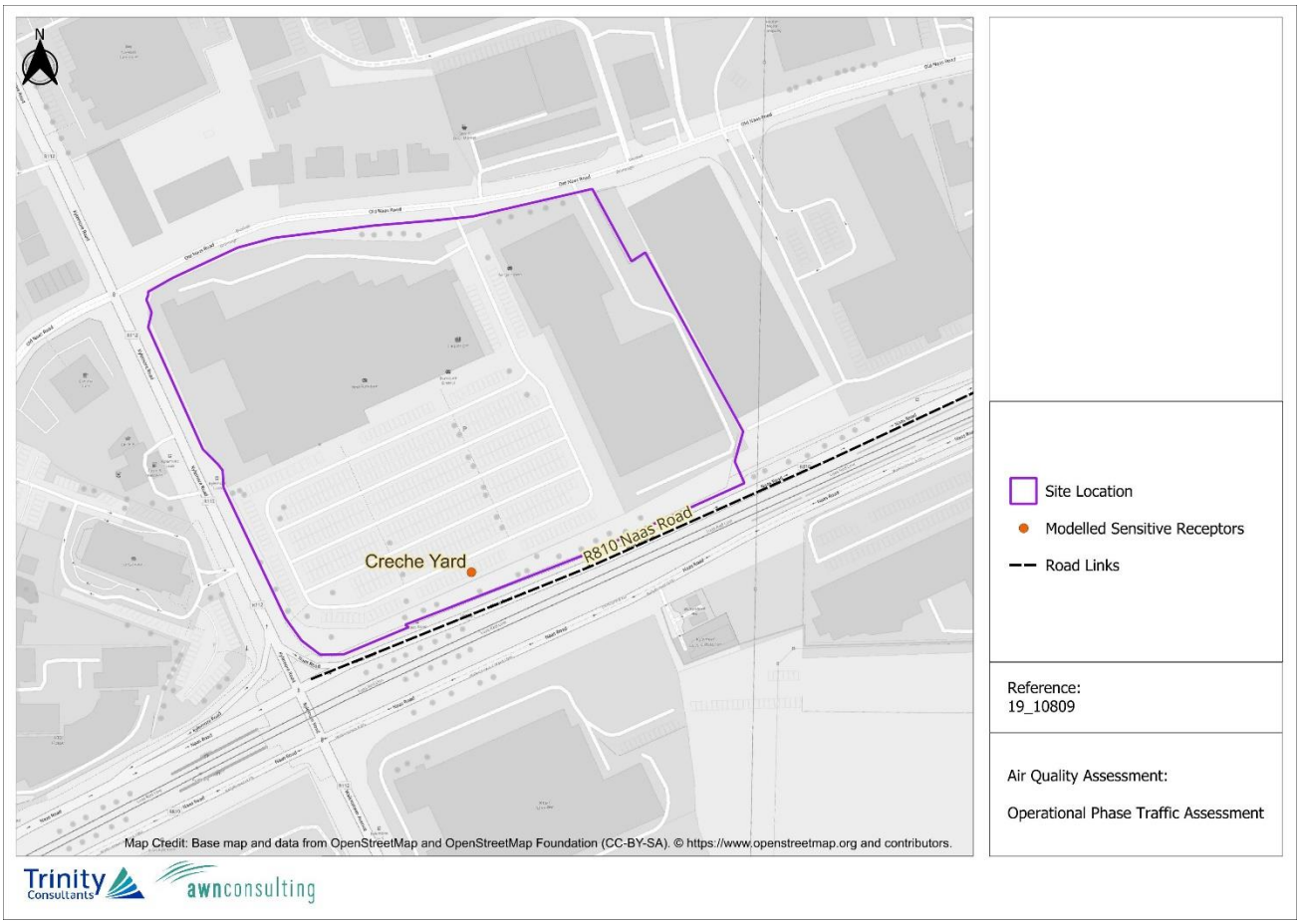
Pollutant	Directive (EU) 2024/2881 Annex I Table 1	
	Limit Type	Limit Value (to be attained by 2030)
Nitrogen Dioxide (NO_2)	Hourly limit for protection of human health - not to be exceeded more than 3 times/year	200 µg/m^3
	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	50 µg/m^3

Pollutant	Directive (EU) 2024/2881 Annex I Table 1	
	Limit Type	Limit Value (to be attained by 2030)
Particulate Matter (as PM_{10})	Annual limit for protection of human health	20 µg/m^3
	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	45 µg/m^3
	Annual limit for protection of human health	20 µg/m^3
Particulate Matter (as $PM_{2.5}$)	24-hour limit for protection of human health - not to be exceeded more than 18 times/year	25 µg/m^3
	Annual limit for protection of human health	10 µg/m^3

2.2 Methodology – Air Quality Assessment of Traffic Emissions

Dispersion modelling of vehicle emissions of NO_2, PM_{10} and $PM_{2.5}$ was undertaken using the TII Road Emissions Model (REM) online tool. The TII criteria state that receptors within 200 m of impacted road links should be assessed; roads which are greater than 200 m from receptors will not impact pollutant concentrations at that receptor (TII, 2025). The location of the creche courtyard, at its closest distance to the R810 Naas Road (c.17 m), was included as the receptor location within the model. The modelled receptor location and modelled road link are shown graphically in Figure 2.

Figure 2. Modelled Receptor Location



2.2.1 Modelling Scenarios

The TII guidance (2025) states that modelling should be conducted for NO_2, PM_{10} and $PM_{2.5}$ for the Base, Opening and Design Years. The following assessment years were included in the assessment:

- Base Year 2025
- Opening Year 2030
- Design Year 2045

The development will not change the traffic flows on the R810 Naas Road and so the traffic remains the same with or without the development in place (i.e. in both the 'do-nothing' and 'do something' scenarios). Therefore, there will be no change in traffic-related pollutant concentrations with the development in place.

2.2.2 Model Inputs

The following inputs are required for the REM tool: receptor locations, light duty vehicle (LDV) annual average daily traffic movements (AADT), heavy duty vehicles (HDV) AADT (HDV AADT), annual average traffic speeds, road link lengths, road type, project county location and pollutant background concentrations. The Default fleet mix option was selected which includes the following assumptions for fleet composition:

- Cars - Climate Action Plan (CAP). The CAP projection assumes that the policies set out in the CAPs up to 2024 are implemented resulting in increased adoption of electrified vehicles.
- LGV - Business as Usual (High Ambition), this is based on a review of market capacity for different technologies within each category. This is broken down further into "high ambition" in the LGV fleet, where the distinction is the rate of adoption of low emissions technologies based on available and emerging technologies, adjusted to recognise the unique conditions, constraints and opportunities in the Irish market.
- HGVs - EU target projections for HGVs, this represents interim targets for emissions from sales of new HGVs.

The Default fleet mix represents a realistic worst-case scenario according to the TII PE-ENV-01106 guidance (2025). The TII REM uses county-based Irish fleet composition for different road types, for different European emission standards from pre-Euro to Euro 6/VI with scaling factors to reflect improvements in fuel quality, retrofitting, and technology conversions. The TII REM also includes emission factors for PM_{10} emissions associated with brake and tyre wear (TII, 2025).

Using this input data the model predicts the road traffic contribution to ambient ground level concentrations at the identified sensitive receptors using generic meteorological data. The predicted road contributions are then added to the background concentrations to give the predicted ambient concentrations. The ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the development with these ambient air quality standards.

Background pollutant concentrations have been included in the assessment as per Table 3 based on available EPA background monitoring data (EPA, 2025).

2.2.3 Traffic Data used in Modelling Assessment

Traffic flow information was provided by DBFL for the purposes of this assessment and is detailed in Table 2. The traffic data included traffic associated with the Royal Liver Phase 2 development site and other cumulative sites as relevant, specifically, the following cumulative developments were included:

- Committed Development: 8, 9, 10, 11, 12, 13 & 14, Old Naas Road Cottages (DCC 2158/17)
- Committed Development: Nissan Site (DCC WEB5179/25)
- Committed Development: Castle View Apartments (ref. 2319/18, 4244/15)
- Committed Development: Royal Liver Phase 1 and Phase 3
- Permitted Development: Parkmore Industrial Estate (SDCC LRD25A/0002W)

Table 2. Traffic Data used in Air Quality Assessment

Road Name	Speed (kph)	Base Year 2025	Opening Year 2030	Design Year 2045
		LDV AADT (HDV AADT)	LDV AADT (HDV AADT)	LDV AADT (HDV AADT)
R810 Naas Road	50	17,848 (1,264)	20,647 (1,445)	21,827 (1,797)

3. BASELINE AIR QUALITY

The development is located in air quality monitoring Zone A. The baseline air quality was established through a review on long-term air monitoring data from the EPA for representative Zone A locations over the period 2020 – 2024. Suburban background locations were determined to be the most representative background for the area of the development. Influences from traffic emissions will be captured within the traffic modelling assessment and therefore, suburban background concentrations give the best indication of other, non-traffic derived sources of pollutants.

3.1.1 Baseline Pollutant Concentrations - NO_2, PM_{10}, $PM_{2.5}$

Long-term NO_2 monitoring was carried out at the representative Zone A suburban background locations of Ballyfermot, Dun Laoghaire, Swords and Tallaght over the period 2020 – 2024 inclusive (EPA, 2025). Long-term average concentrations are significantly below the current annual average limit value of 40 µg/m^3. Average annual mean results range from 10 – 16 µg/m^3. The overall annual average concentration for this 5-year period is 13 µg/m^3. Additionally, there were no exceedances of the hourly limit value of 200 µg/m^3. Based on the above information a conservative estimate of the current background NO_2 concentration for the region of the development is 13 µg/m^3.

Continuous PM_{10} monitoring was carried out at the representative Zone A suburban background locations of Ballyfermot, Dun Laoghaire, Finglas, St. Anne's Park and Tallaght over the period 2020 – 2024 (EPA, 2025). Long-term PM_{10} concentrations are in compliance with the current annual average limit value of 40 µg/m^3. Annual average PM_{10} concentrations across the sites ranged from 9 – 14 µg/m^3 over the 2020 – 2024 period. The overall annual average concentration for this 5-year period is 12 µg/ m^3. Based on the EPA data, a conservative estimate of the current background PM_{10} concentration in the region of the development is 12 µg/m^3.

Average $PM_{2.5}$ levels in Ballyfermot, Dun Laoghaire, Finglas, Marino and St. Anne's Park over the period 2020 - 2024 ranged from 6 - 9 µg/m^3, (EPA, 2025) which is in compliance with the current annual mean limit value of 25 µg/m^3. The overall annual average concentration for this 5-year period is 7 µg/m^3. Based on this information, a background $PM_{2.5}$ concentration in the region of the development of 7 µg/m^3 has been used in the assessment.

Table 3. Zone A Suburban Background Baseline Pollutant Concentrations

NO_2	PM_{10}	$PM_{2.5}$
13 µg/m^3	12 µg/m^3	7 µg/m^3

3.1.2 Future Background Concentrations Projections

The TII PE-ENV-01106 (2025) guidance provides a methodology for predicting future year background concentrations. This is necessary to allow for changes in background air quality in future years. For the purposes of the air quality assessment of traffic emissions, impacts are predicted for the future opening and design years for the development and it is overly pessimistic to assume that the current background pollutant concentrations will remain the same in these future years.

Future year projection factors are provided in Appendix C of the PE-ENV-01106 guidance (TII, 2025). Projection factors have been provided to allow for calculation of background pollutant concentrations up to 2040. Where background concentrations beyond 2040 are required TII state that the background concentrations for 2040 can be used as representative concentrations the future year (TII, 2025).

The realistic worst-case scenario has been applied in relation to future year background projections.

Current baseline background pollutant concentrations have been derived from EPA data in Table 3. These baseline concentrations have been used in combination with the future year projection factors to produce background concentrations for the Opening Year of 2030 and the Design Year of 2045 for the development. The background concentrations used in this assessment are shown in Table 4.

Table 4. Adjusted Future Background Pollutant Concentrations

Pollutant	Base Year (µg/m^3)	Opening Year (µg/m^3)		Design Year (µg/m^3)	
		Adjustment Factor	Adjusted Background	Adjustment Factor	Adjusted Background
NO_2	13.0	0.86	11.2	0.77	10.0
PM_{10}	12.0	0.96	11.5	0.90	10.8
$PM_{2.5}$	7.0	0.94	6.6	0.85	5.9

4. AIR QUALITY ASSESSMENT

The results of the modelling assessment are detailed in Table 5. The NO_2, PM_{10} and $PM_{2.5}$ annual mean concentrations have been predicted for the existing base year (2025), development opening year (2030) and development design year (2045). The pollutant concentrations are predicted for the area of the creche courtyard, directly adjacent to the R810 Naas Road. Pollutant concentrations will decrease with increasing distance from the road.

Pollutant concentrations have been compared against the post-2030 ambient air quality limit values set out in Table 1 and following the TII PE-ENV-01106 guidance. These limit values are more stringent than the current limit values set under the Air Quality Standards Regulations 2022 which are applicable up to December 2026. Therefore, this assessment has ensured a conservative approach.

In relation to short term pollutant concentrations, the 1-hour and daily limit values for NO_2 are not predicted to be exceeded due to the low annual mean concentrations. The TII guidance states that where the annual mean NO_2 concentration is below 30 µg/m^3 the hourly NO_2 limit value is unlikely to be exceeded.

Where the annual mean NO_2 concentration is below 25 µg/m^3 the daily NO_2 limit value is unlikely to be exceeded.

Similarly, for PM_{10}, an annual mean concentration of 22.8 µg/m^3 is an appropriate annual value, below which the 24 hour PM_{10} limit value is unlikely to be exceeded. For $PM_{2.5}$, an annual mean concentration of 10.4 µg/m^3 is an appropriate annual value, below which the 24-hour $PM_{2.5}$ limit value is unlikely to be exceeded. The predicted annual mean PM_{10} and $PM_{2.5}$ concentrations are below these thresholds and therefore, the short-term limits are not predicted to be exceeded.

Predicted pollutant concentrations are in compliance with the relevant limit values in the base year, opening year and design year. Concentrations are predicted to decrease in future years, this is due to decreasing background concentrations and increases in the number of electric vehicles and subsequent reduction in petrol/diesel powered vehicles within the national fleet.

Table 5. Predicted Pollutant Annual Mean Concentrations

Pollutant	Predicted Annual Mean Concentration (µg/m^3)	Annual Mean Limit Value (µg/m^3)	Conc. as % of Limit Value
Base Year			
NO_2	15.6	20	78%
PM_{10}	15.8	20	79%
$PM_{2.5}$	9.0	10	90%
Opening Year			
NO_2	12.2	20	61%
PM_{10}	15.0	20	75%
$PM_{2.5}$	8.4	10	84%
Design Year			
NO_2	10.1	20	50%
PM_{10}	14.3	20	71%
$PM_{2.5}$	7.8	10	78%

5. CONCLUSION

An assessment of the air quality impact from traffic emissions on the creche courtyard area has been undertaken.

Predicted NO_2, PM_{10} and $PM_{2.5}$ pollutant concentrations will be in compliance with the relevant air quality limit values indicating that significant air quality effects are unlikely at the creche courtyard.

6. REFERENCES

Environmental Protection Agency (2025) Air Quality in Ireland 2024 (& previous annual reports 2020-2023)

Transport Infrastructure Ireland (2025a) Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106

Transport Infrastructure Ireland (2025b) TII Road Emissions Model (REM): Model Development Report – GE-ENV-01107