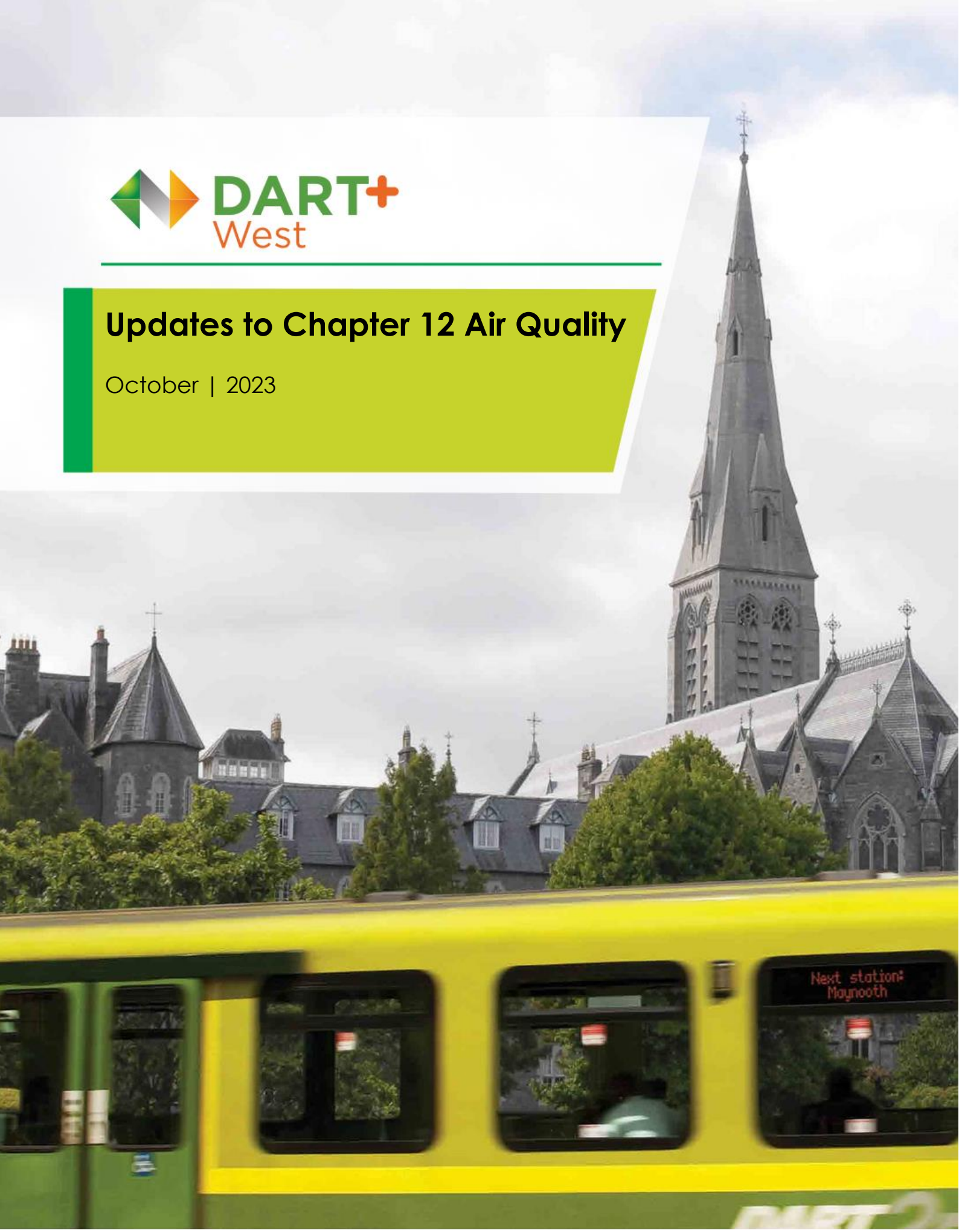
DART+ West

Updates to Chapter 12 Air Quality

October | 2023



Tionscadal Éireann
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2040

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1. INTRODUCTION

This ‘Updates to Chapter 12 Air Quality’ presents the updates to legislation and policy since the time of publication of the draft Railway Order (RO). The following sections present the updates.

2. AIR QUALITY STANDARD REGULATIONS

The 2011 Air Quality Standard Regulations (S.I. No. 180 of 2011), published April 19th 2011, are considered as the appropriate standards within Chapter 12 of the EIAR. These have been superseded by the 2022 Ambient Air Quality Standard Regulations (S.I. No. 739 of 2022) published on January 10th, 2023. At the date of publication of the DART+ West EIAR the new Air Quality regulations were not published and therefore the 2011 regulations were referenced within the Air Quality EIAR chapter.

It is noted that, Córas Iompair Éireann, hereafter referred to as CIÉ or 'the Applicant', is applying to An Bord Pleanála for a Railway Order ("RO") for the DART+ West project ("the proposed project" or "proposed development") under the Transport (Railway Infrastructure) Act 2001 (as amended and substituted) ('the 2001 Act"). Although, the statutory requirements for a Railway Order application and the requirement to prepare an EIAR arises under the 2001 Act and the EIA Directive, the Air Quality Assessment Standard for Proposed National Roads guidance has been applied.

3. WHO TARGETS

On 26th October 2022 the EU published a proposal (COM/2022/542) for an updated Air Quality Directive, which more closely aligns with WHO limit values published in 2021. The EU Ambient Air Quality Directive also required updates to adapt to the priorities of the European Green Deal and in particular to its zero-pollution pillar. The zero-pollution pillar states that by 2050, pollution should be reduced to levels no longer considered harmful to health and natural ecosystems.

Publication of new WHO guidelines in 2021 was acknowledged in the DART+ West air quality chapter but the EU limit values were taken as the legal limit values for comparison within the chapter.

A briefing note by the European Parliamentary Research Service in October 2022 "Revision of the EU Ambient Air Quality Directives" for the European Parliament describes the difference between the EU air quality standards and the WHO air quality guidelines – *"the air quality reference values for a number of pollutants, defined by the WHO, are intended as policy guidance only, while the EU standards, as defined by the Ambient Air Quality Directive, are mandatory."* The air quality impacts of the Proposed Project have been assessed for compliance with the mandatory limit values outlined in the Air Quality Regulations, which incorporate the EU CAFE Directive.

The WHO guidelines are based solely on health considerations, while the EU standards reflect broader considerations, such as technical feasibility and the political, economic and social aspects of achieving these standards.

Limit values for the protection of human health to be attained by 1 January 2030 are contained within the published proposal (COM/2022/542) for an updated Air Quality Directive. Annual mean limit values for the protection of human health, which remain higher than WHO targets, include:

- NO_2 – 20 µg/m^3
- PM_{10}– 20 µg/m^3
- $PM_{2.5}$– 10 µg/m^3

However, lower assessment thresholds for health protection are also included in Annex 2 which align with the WHO targets. These values are:

- NO_2 – 10 µg/m^3
- PM_{10}– 15 µg/m^3
- $PM_{2.5}$– 5 µg/m^3

In addition to the new Air Quality Standard Regulations (See Section 2), in April 2023, the Government of Ireland published the Clean Air Strategy for Ireland, 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 (IT) 3 by 2026, the IT4 targets by 2030 and the final targets by 2040 (shown in Table 1). 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/m^3. 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". At the date of publication of the DART+ West EIAR the new Clean Air Strategy for Ireland was not published.

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. However, the appropriate compliance limit values for the assessment of air quality impacts of the Proposed Scheme remain those outlined in the existing Air Quality Regulations, which incorporate the CAFE Directive.

Table 1 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/m^3 NO_2	50µg/m^3 NO_2	25µg/m^3 NO_2
		Annual limit for protection of human health	30µg/ m^3 NO_2	20µg/ m^3 NO_2	10µg/m^3 NO_2
PM (as PM_{10})		24-hour limit for protection of human health	75µg/ m^3 PM_{10}	50µg/m^3 PM_{10}	45µg/m^3 PM_{10}
		Annual limit for protection of human health	30µg/ m^3 PM_{10}	20µg/ m^3 PM_{10}	15µg/m^3 PM_{10}
PM (as $PM_{2.5}$)		24-hour limit for protection of human health	37.5µg/m^3 $PM_{2.5}$	25µg/m^3 $PM_{2.5}$	15µg/m^3 $PM_{2.5}$
		Annual limit for protection of human health	15µg/m^3 $PM_{2.5}$	10µg/m^3 $PM_{2.5}$	5µg/m^3 $PM_{2.5}$

4. CONSTRUCTION PHASE DUST ASSESSMENT

In August 2023 the Institute of Air Quality Management (IAQM) published updated Guidance on the assessment of dust from demolition and construction (IAQM 2023). This updated the previous IAQM guidance document, first published in 2014 with minor updates in 2016. While there are changes within the 2023 guidance document the outcome of the assessment and mitigation to be applied for low, medium and high-risk sites remains as per the previous guidance contained within Chapter 12 (Air Quality) of the EIAR.

The guidance changes include a reduction in the distance at which you can scope out the potential for impacts if there are no receptors from 350m to 250m. In addition, the potential dust emission magnitudes have changed for the impact assessment criteria. A summary of the new and old magnitudes is provided in Section 4.1.

4.1 Changes between 2023 and previous IAQM Dust Guidance

The following sections set out the changes between the previous iteration of the IAQM Dust Guidance and the updated 2023 publication. The application of the magnitudes of impact and the sensitivity of receptors remains as per detailed in Section 12.3.5.2 of Chapter 12 (Air Quality) of the EIAR.

In December 2022 Transport Infrastructure Ireland (TII) published new guidance documents and standards for the EIAR with respect to Air Quality; PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects (TII 2022a) and PE-ENV-01107: Air Quality Assessment Standard for Proposed National Roads (TII 2022b). These documents refer to the use of an IAQM dust assessment as per the 2014/2015 guidance document as the appropriate methodology.

4.1.1 Potential Dust Emission Magnitudes from Demolition

In the 2023 guidance, the demolition criteria increases the range of what a medium magnitude, allowing for a greater volume to be demolished prior it being a large magnitude. It also reduces the height above ground level that demolition actives are considered large in magnitude.

2023 Guidance

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

2014/2016 Guidance

- Large: Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level;
- Medium: Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- Small: Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months.

4.1.2 Potential Dust Emission Magnitudes from Earthworks

In the 2023 guidance a small magnitude is now more conservative, therefore a smaller site area will move you into medium but medium has a significantly larger scale.

2023 Guidance

- Large: Total site area >110,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >6 m in height;
- Medium: Total site area 18,000 m^2 – 110,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3m - 6m in height; and
- Small: Total site area <18,000 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height.

2014/2016 Guidance

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

4.1.3 Potential Dust Emission Magnitudes from Construction

In the 2023 guidance a small is now more conservative, this means that a smaller site area will move you into medium magnitude. In addition, a smaller volume building will make you fall into a large magnitude that in the previous iteration of the guidance.

2023 Guidance

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

2014/2016 Guidance

- Large: Total building volume >100, 000 m^3, on site concrete batching, sandblasting;
- Medium: Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and
- Small: Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

4.1.4 Potential Dust Emission Magnitudes from Trackout

In the 2023 guidance, a small magnitude is now less conservative (20 rather than 10), however the amount of outward movements in one day for a large magnitude stays the same

2023 Guidance

- Large: >50 HDV (>3.5t) outward movements in any one day,10 potentially dusty surface material (e.g. high clay content), unpaved road length >100 m;
- Medium: 20-50 HDV (>3.5t) outward movements9 in any one day,10 moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m; and
- Small: <20 HDV (>3.5t) outward movements9 in any one day,10 surface material with low potential for dust release, unpaved road length <50 m.

2014/2016 Guidance

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

4.2 Changes to Recommendations for Dust Mitigation

The 2023 IAQM dust guidance (IAQM 2023) does not list any changes to recommended mitigation in the record of substantive amendments set out in the opening of the document. A review of the mitigation measures published confirms this.

While an assessment of the potential sensitivity, magnitude and potential risk due to construction dust was carried out within the Section 12.5.1.4.1 Chapter 12 (Air Quality) of the EIAR, the same mitigation has been applied across all areas where construction or construction related activities (i.e. storage compounds) occur. Applying dust mitigation for high-risk sites ensures the residual risk due to construction dust will be short-term, localised, reversible and not significant. Measures are contained within Appendix 12.4 (Dust Mitigation) to Chapter 12 (Air Quality) of the EIAR and the Construction Environmental Management Plan (CEMP). It is recommended this approach is applied to the updated guidance document and all sites will be considered high risk to dust impacts in order to ensure robust and conservative mitigation is put in place.

No changes to the mitigation measures for the DART+West are recommended based on the updated Guidance on the assessment of dust from demolition and construction (IAQM 2023) compared to the previous iteration of the guidance document.

4.3 Summary

While there are changes within the updated 2023 publication of the IAQM Guidance document on the assignment of the potential magnitude of dust risk, the residual risk of the construction dust assessment and mitigation which is recommend by the IAQM to be applied for low, medium and high-risk sites remains as per the previous guidance contained within Chapter 12 (Air Quality) of the EIAR.

This is due to no changes in the mitigation recommended by the IAQM in the updated guidance. Within the EIAR it was stated (Chapter 12 (Air Quality) Section 12.6.1 and Appendix 12.4 (Dust Mitigation) to Chapter 12 (Air Quality) of the EIAR) that strict dust prevention will always be in place, to minimise any potential emissions and these procedures will be strictly monitored and assessed. Dust mitigation for high-risk sites will be applied across all construction activities in order to ensure the residual risk was short-term, localised, reversible and not significant.

5. CONSTRUCTION PHASE TRAFFIC ASSESSMENT

5.1 Introduction

In December 2022 Transport Infrastructure Ireland (TII) published new guidance documents and standards for the EIAR with respect to Air Quality:

- PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects (TII 2022a);
- PE-ENV-01107: Air Quality Assessment Standard for Proposed National Roads (TII 2022b).

These guidance documents were issued in December 2022 and supersede the 2011 Transport Infrastructure Ireland '*Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes'*, or 2011 TII Air Quality Guidelines. The methodology for assessing national roads and other specified infrastructure projects, such as light rail, in PE-ENV-01106 is based on methodology employed in the UK, namely Highways England 2019 guidance *'Design Manual for Roads and Bridges (DMRB) LA 105'* (an older version is referred to in the 2011 TII Air Quality Guidelines) and the UK Department for Environment Food & Rural Affairs (DEFRA) 2022 *'Local Air Quality Management, Technical Guidance LAQM.TG(22)'*. LA 105 and the 2011 TII Air Quality Guidelines were used as the basis of the air quality assessment within the EIAR.

Section 1.9 of PE-ENV-01107 (Air Quality Assessment Standard for Proposed National Roads) states that:

'where projects requiring approval under Section 51, Section 177AE or Part 8 have, at the date of publication of this SD, commenced planning and design, and in particular, where technical advisor contracts have been executed, this *SD should be:*

- treated as advice and guidance;
- employed to the greatest extent reasonably practicable; and
- applied in a proportionate manner, having regard to the characteristics and location of the project/maintenance works and the type and characteristics of potential impacts.'

The air quality competent expert was appointed in 2020, wherein scope and methodology were agreed. At the date of publication of the updated guidance all air quality assessments were complete, and the EIAR was submitted. As per Section 1.9 of PE-ENV-01107 given above, it was therefore considered reasonably practicable to retain the use of previous guidance published prior to the submission of the EIAR.

It is noted that, Córas Iompair Éireann, hereafter referred to as CIÉ or 'the Applicant', is applying to An Bord Pleanála for a Railway Order ("RO") for the DART+ West project ("the proposed project" or "proposed development") under the Transport (Railway Infrastructure) Act 2001 (as amended and substituted) ('the 2001 Act"). Although the statutory requirements for a Railway Order application and the requirement to prepare an EIAR arises under the 2001 Act and the EIA Directive, the Air Quality Assessment Standard for Proposed National Roads guidance has been applied.

In order to ensure no additional impacts occur as a result of the guidance update, AWN Consulting have conducted a sensitivity analysis of the traffic impacts by remodelling the construction phase traffic data using the 2022 TII guidance methodology and assessed the impacts using the updated significance outlined in PE-ENV-01106. This technical note details the outputs of the sensitivity analysis.

5.2 Methodology Updates

The TII guidance (TII, 2022a) states that the following scoping criteria shall be used to determine whether the air quality impacts can be scoped out or require an assessment, based on the changes between the Do

Something traffic (with the Proposed development) compared to the Do Minimum traffic (without the Proposed development):

- Road alignment will change by 5 m or more; or
- Annual average daily traffic (AADT) flows will change by 1,000 or more; or
- Heavy duty vehicle (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more; or
- Daily average speed change by 10 kph or more; or
- Peak hour speed will change by 20 kph or more.

The above scoping criteria are in alignment with the previous LA 105 - Air Quality scoping criteria (UKHA 2019) set out in Section 12.3.5 of the EIAR. Therefore, no changes to the impacted traffic links are proposed as part of the sensitivity analysis.

Chapter 12 Section 12.3.5.1.1 and 12.3.5.1.2 of the EIAR details the procedure for the screening assessment and detailed assessment of local road traffic respectively. The screening assessment was deemed suitable for the construction phase traffic impacts which were and utilised the UKHA DMRB model (UKHA 2019). In acknowledgement of the DMRB air quality spreadsheet limitations, LA 105 - Air Quality (UKHA 2019) states that the DMRB spreadsheet tool may still be used for simple air quality assessments where it is deemed unlikely to lead to a breach of the air quality standards. Due to its use of an older and thus 'dirtier' fleet, vehicle emissions levels would be higher than more modern models and therefore any results will be conservative in nature and will provide a worst-case assessment of potential adverse impacts.

The new TII guidance (TII, 2022a) was published with an associated Roads Emission Model (REM) (TII, 2022c). The REM generates road traffic emission rates for NO_X, PM_{10} and $PM_{2.5}$ which are derived using traffic data for the baseline year of 2019, opening year of 2028 and the design year of 2043 provided. The TII REM tool incorporates emission factors from the COPERT V database (EMISIA, 2020). The traffic volumes, assessment years and receptors (human and ecology) have not been altered from those detailed in Section 12.5.1.7 and Section 12.5.1.8 of the EIAR.

The following inputs are required for the REM tool: receptor locations, light duty vehicle (LDV) annual average daily traffic movements (AADT), annual average daily heavy-duty vehicles (HDV AADT), annual average traffic speeds, road link lengths, road type, project county location and pollutant background concentrations. The Default fleet mix option was selected along with the Intermediate Case fleet data base selection, as per TII Guidance (TII, 2022c). The Intermediate Case assumes a linear interpolation between the Business-as-Usual case – where current trends in vehicle ownership continue and the Climate Action Plan (CAP) case – where adoption of low emission light duty vehicles occurs. The TII REM uses county-based Irish fleet composition for different road types, for different European emission standards from pre-Euro to Euro 6/VI with scaling factors to reflect improvements in fuel quality, retrofitting, and technology conversions. The TII REM also includes emission factors for PM10 emissions associated with brake and tyre wear (TII, 2022c).

In the Section 12.3.5.1 of the EIAR the criteria for section of a screening or detailed dispersion model (e.g., ADMS) assessment are discussed. The criteria from LA 105 Air Quality (UKHA 2019) align with the criteria set out in the new TII guidance (TII, 2022a). The sensitivity analysis in this technical note therefore retains the same road link selection of screening and detailed dispersion modelled areas. Where the DMRB model was utilised in the EIAR, the REM has now been applied. The REM replaces the use of the EFT (see Section 12.3.5.1.2 of the EIAR for details) for the calculation of emission factors which are input into ADMS (Air dispersion modelling software).

Road traffic emission rates for NH_3 were generated using the best available method at the time of undertaking the assessment, namely the Calculator for Road Emissions of Ammonia (CREAM) Tool developed by Air Quality Consultants (AQC, 2020), as recommended by TII (TII, 2022a).

5.3 Significance Criteria Updates

The significance criteria given in the 2011 TII Air Quality Guidelines (Boxes A10.1, A10.2 and A10.3) were employed in the DART+ West air quality assessment (see Section 12.3.6.1 Chapter 12 Air Quality of the EIAR). These criteria are based on absolute concentrations – both the magnitude of change due to the scheme and also the modelled concentration relative to the limit value. Table 2 (reproduced from Boxes A10.1 and A10.2 of 2011 TII Air Quality Guidelines) demonstrates that a substantial adverse impact at a modelled receptor would occur if the modelled nitrogen dioxide (NO_2) concentration at that receptor was above the limit value of 40 µg/m^3 combined with a change in concentration due to the scheme of more than 4 µg/m^3.

Table 2 TII 2011 Air Quality Guidelines – Significance Criteria (reproduced from Boxes A10.1 and A10.2)

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration		
	Small (Increase of 0.4 - <2 µg/m^3)	Medium (Increase of 2 - <4 µg/m^3)	Large (Increase of ≥4 µg/m^3)
Increase with Scheme			
Above Objective/Limit Value With Scheme (≥40 µg/m^3 of NO_2 or PM_{10}) (≥25µg/m^3 of $PM_{2.5}$)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value With Scheme (36-<40 µg/m^3 of NO_2 or PM_{10}) (22.5-<25 µg/m^3 of $PM_{2.5}$)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme (30-<36 µg/m^3 of NO_2 or PM_{10}) (18.75-<22.5 µg/m^3 of $PM_{2.5}$)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value With Scheme (<30 µg/m^3 of NO_2 or PM_{10}) (<18.75 µg/m^3 of $PM_{2.5}$)	Negligible	Negligible	Slight Adverse

The updated significance criteria in PE-ENV-01106 are based on modelled concentrations as a percentage of the air quality limit value (AQLV), as shown in Table 3 below. The impact categories differ from those in the 2011 TII Air Quality Guidelines in that they relate to percentages of the AQLV and therefore have the potential to change with future changes to AQLVs. A neutral effect is a change in concentration at a receptor of:

- 5% or less where the opening year, without the proposed development annual mean concentration is 75% or less of the standard; or
- 1% or less where the opening year, without the proposed development annual mean concentration is 94% or less of the standard.

Substantial adverse impacts may now occur under more conditions, as shown in Table 3, relative to the one substantial impact category in the 2011 TII Air Quality Guidelines.

Table 3 TII 2022 PE-ENV-01107 Significance Criteria (reproduced from Table 3.21 Impact Descriptors)

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Limit Value (AQLV)			
	1	2-5	6-10	>10
75% or less of AQLV	Neutral	Neutral	Slight	Moderate
76 – 94% of AQLV	Neutral	Slight	Moderate	Moderate
95 – 102% of AQLV	Slight	Moderate	Moderate	Substantial
103 – 109% of AQLV	Moderate	Moderate	Substantial	Substantial
110% or more of AQLV	Moderate	Substantial	Substantial	Substantial

5.4 Impact Assessment

The air dispersion modelling assessment for construction phase road traffic contained within the Chapter 12 of the EIAR (Section 12.5.1.2) for road traffic impacts found that in 2026, the worst-case construction year, all receptors will have ambient air quality in compliance with the ambient air quality standards for the Do Something (and Do Nothing) scenario. There are no moderate or substantial adverse effects expected as a result of the construction phase of the proposed development, and any impacts will be short-term in nature. This is detailed for impacts on human receptors in Section 12.5.1.2 and ecological receptors in Section 12.5.1.3 of the EIAR.

Using the same traffic data, assessment years and receptors the assessment has been completed using the TII REM (TII 2022c) as per PE-ENV-01106 (TII 2022a).

5.4.1 Construction Phase Traffic Impacts on Human Receptors

5.4.1.1 Screening Assessment

5.4.1.1.1 EIAR – Simple DMRB Assessment

Section 12.5.1.2.1 of the EIAR details the modelled air quality receptors and traffic data for the simple DMRB assessment. The outcome of the assessment in the EIAR found that the impact of the proposed development in terms of NO_2 to be negligible and small increases in concentrations, while changes in PM_{10} and $PM_{2.5}$ concentrations are considered negligible. Once compared to the significance criteria in Section 12.3.6, these increases are deemed to be negligible according to TII guidance (TII 2011). In accordance with the EPA Guidelines (EPA 2022) the likely effects associated with the construction phase traffic emissions pre-mitigation are not significant and short-term.

5.4.1.2 Sensitivity Analysis for New 2022 TII Guidance using REM

The results of the sensitivity assessment of the impact of the proposed development on NO_2, PM_{10} and $PM_{2.5}$ in the peak construction year of 2026 in line with the updated TII Guidance (TII 2022a) are shown in Table 4 to Table 6. In keeping with the EIAR, the annual average concentration is in compliance with the relevant EU limit value at all worst-case receptors in 2026. Modelled concentrations of NO_2, PM_{10} and $PM_{2.5}$ in 2028 and 2043 are at most 34%,43% and 43% of their respective annual limit values. The hourly limit value for NO_2 is 200 µg/m^3 and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The maximum 1-hour NO_2 concentration is not predicted to be exceeded in any modelled year.

The outcome of the sensitivity study in Table 4 to Table 6 below found that the impact of the proposed development in terms of NO_2, PM_{10} and $PM_{2.5}$ remains consistent with the impact within the EIAR, with no significant impacts. All impacts are considered neutral in accordance with PE-ENV-01106 (TII 2022a), as the changes in concentration are 5% or less and in the opening year Do Nothing scenario the annual mean concentration is 75% or less of the AQLV. In accordance with the EPA Guidelines (EPA, 2022) the likely effects associated with the construction phase traffic emissions pre-mitigation are both *negative* and *positive*, but *not significant* and *long-term*.

In summary, the construction phase road traffic impacts, in accordance with the new TII Guidance (2022a), in EIA terms are overall *not significant*. This is in keeping with the Section 12.5.1.2.1 of the EIAR.

In addition to the results detailed in Table 4,5 and 6 a further sensitivity check has been conducted for the WHO air quality guidance interim target value in 2026 (see Table 1). This found that the significance of impacts (Table 3) remained neutral at all modelled receptors for NO_2, PM_{10} and $PM_{2.5}$.

Table 4 Predicted Annual Mean NO_2 Concentrations for Screening Assessment

Receptor	Impact Peak Construction Year (µg/m³)				
	DN	DS	DS-DN	% Change of AQAL	Description
1	12.1	12.3	0.19	0.47%	Neutral
2	11.1	11.4	0.26	0.65%	Neutral
3	11.3	11.6	0.32	0.80%	Neutral
4	10.3	10.3	0.04	0.10%	Neutral
5	11.5	11.8	0.36	0.90%	Neutral
6	11.4	11.5	0.11	0.28%	Neutral
7	10.9	11.0	0.13	0.32%	Neutral
8	10.7	10.7	0.06	0.15%	Neutral
9	12.3	12.4	0.12	0.30%	Neutral
10	11.1	11.2	0.10	0.25%	Neutral
11	13.2	13.4	0.16	0.40%	Neutral
12	12.9	13.0	0.14	0.35%	Neutral
13	13.4	13.5	0.17	0.43%	Neutral
14	12.7	12.7	0.03	0.07%	Neutral
15	13.2	13.2	0.04	0.10%	Neutral
16	11.3	11.6	0.33	0.83%	Neutral
17	12.1	12.1	0.03	0.08%	Neutral
18	12.1	12.1	0.02	0.05%	Neutral

Table 5 Predicted Annual Mean PM_{10} Concentrations for Screening Assessment

Receptor	Impact Peak Construction Year (µg/m³)				
	DN	DS	DS-DN	% Change of AQAL	Description
1	15.7	16.0	0.29	0.72%	Neutral
2	14.9	15.3	0.39	0.97%	Neutral
3	15.0	15.5	0.48	1.20%	Neutral
4	14.2	14.3	0.05	0.12%	Neutral
5	15.2	15.7	0.55	1.38%	Neutral
6	15.1	15.3	0.17	0.43%	Neutral
7	14.8	15.0	0.20	0.50%	Neutral
8	14.6	14.7	0.09	0.23%	Neutral
9	16.1	16.2	0.11	0.27%	Neutral
10	14.9	15.0	0.09	0.23%	Neutral
11	16.6	16.8	0.20	0.50%	Neutral
12	16.3	16.5	0.18	0.45%	Neutral
13	16.7	16.9	0.21	0.52%	Neutral
14	16.5	16.6	0.05	0.12%	Neutral
15	17.0	17.0	0.07	0.18%	Neutral
16	15.1	15.6	0.49	1.23%	Neutral
17	15.9	15.9	0.05	0.12%	Neutral

Receptor	Impact Peak Construction Year (µg/m³)				
	DN	DS	DS-DN	% Change of AQAL	Description
18	16.0	16.0	0.04	0.10%	Neutral

Table 6 Predicted Annual Mean $PM_{2.5}$ Concentrations for Screening Assessment

Receptor	Impact Peak Construction Year (µg/m³)				
	DN	DS	DS-DN	% Change of AQAL	Description
1	10.0	10.1	0.16	0.40%	Neutral
2	9.5	9.7	0.22	0.55%	Neutral
3	9.6	9.8	0.26	0.65%	Neutral
4	9.1	9.2	0.03	0.08%	Neutral
5	9.7	10.0	0.31	0.78%	Neutral
6	9.6	9.7	0.10	0.25%	Neutral
7	9.4	9.6	0.11	0.28%	Neutral
8	9.3	9.4	0.05	0.13%	Neutral
9	10.2	10.2	0.06	0.15%	Neutral
10	9.5	9.6	0.04	0.10%	Neutral
11	10.4	10.6	0.12	0.30%	Neutral
12	10.3	10.4	0.11	0.28%	Neutral
13	10.5	10.6	0.12	0.30%	Neutral
14	10.4	10.4	0.03	0.07%	Neutral
15	10.7	10.7	0.04	0.10%	Neutral
16	9.6	9.9	0.27	0.67%	Neutral
17	10.1	10.1	0.02	0.05%	Neutral
18	10.1	10.1	0.02	0.05%	Neutral

5.4.1.3 Detailed ADMS Assessment

5.4.1.3.1 EIAR – Detailed ADMS Assessment

Section 12.5.1.7.2 of the EIAR details the modelled air quality receptors and traffic data for the detailed dispersion impact assessment in the region of Spencer Dock. The outcome of the assessment in the EIAR found that the impact of the proposed development in terms of NO_2, PM_{10} and $PM_{2.5}$ is considered negligible when modelling outputs are compared to the significance criteria in Section 12.3.6 of the EIAR. Therefore, it is accordance with the EPA Guidelines (EPA 2022), the likely effects of the proposed development construction are considered overall *short-term*, *localised* and *not significant*.

5.4.1.3.2 Sensitivity Analysis for New 2022 TII Guidance using REM and ADMS

The results of the sensitivity assessment of the impacts of the proposed development on NO_2, PM_{10} and $PM_{2.5}$ in the worst-case construction year of 2026 in line with the updated TII Guidance (TII 2022a) are shown in Table 4 to Table 6. In keeping with the EIAR, the annual average concentration is in compliance with the appropriate EU limit value at all worst-case receptors in 2026. Modelled concentrations of NO_2, PM_{10} and $PM_{2.5}$ in 2026 are at most 99%, 52% and 56% of their respective annual limit values. The hourly limit value for NO_2 is 200 µg/m^3 and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The maximum 1-hour NO_2 concentration is not predicted to be exceeded in any modelled year.

The outcome of the sensitivity study in Table 7 to Table 9 below found that the impact of the proposed development in terms of NO_2, PM_{10} and $PM_{2.5}$ remains consistent with the impact within the EIAR, with no

significant adverse impacts. In accordance with PE-ENV-01106 (TII 2022a) (Table 2) there are 15 slight adverse effects, 2 slight beneficial effects, 4 moderate beneficial effects and all other impacts are considered neutral.

In accordance with the EPA Guidelines (EPA, 2022) the likely effects associated with the construction phase traffic emissions pre-mitigation are both *negative* and *positive*, *localised* but *not significant* and *short-term*.

In summary, the construction phase road traffic impacts, in accordance with the new TII Guidance (2022a), in EIA terms are overall *not significant*. This is in keeping with the Section 12.5.1.2.2 of the EIAR.

In addition to the results detailed in Table 9 a further sensitivity check has been conducted for the WHO air quality guidance interim target value in 2026 (see Table 1). This found an increase in both beneficial and adverse impacts as a result of the proposed development:

- Number of receptors predicted to experience a negligible effect:163
- Number of receptors predicted to experience a slight adverse effect: 29
- Number of receptors predicted to experience a moderate adverse effect: 22
- Number of receptors predicted to experience a substantial adverse effect:2
- Number of receptors predicted to experience a slight beneficial effect: 2
- Number of receptors predicted to experience a moderate beneficial effect: 8
- Number of receptors predicted to experience a substantial beneficial effect: 0

However, should the WHO limit values become the legal limit values in Ireland the impact of mitigation put in place in order to achieve them would likely improve air quality across the city. Improvements in background concentrations have not considered as part of the analysis and therefore the impacts described above are likely worst-case impacts. An improvement in background air quality has the potential to result in a lower impact due to the assignment of significance (see Table 3). In addition, impacts are short-term and localised in nature.

Table 7 Predicted Do-Minimum Concentrations for Detailed ADMS Model

DM (2026)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m^3)			No of PM_{10} days > 50 µg/m^3
		NO_2	PM_{10}	$PM_{2.5}$	
CP_DA11	717801,734432	34.0	19.3	12.9	3
CP_DA161	717207,734488	32.0	18.4	12.5	2
CP_DA164	717326,734479	30.2	17.8	12.1	1
CP_DA163	717308,734481	30.0	17.7	12.0	1
CP_DA165	717383,734475	29.6	17.5	12.0	1
CP_DA10	717736,734441	30.2	17.7	12.1	1
CP_DA170	717855,734430	30.3	17.8	12.1	1
CP_DA162	717264,734486	29.4	17.4	11.9	1
CP_DA140	716911,734514	30.5	17.9	12.2	2
CP_DA219	716956,734511	30.2	17.8	12.1	1
CP_DA139	716925,734514	29.7	17.6	12.0	1
CP_DA221	716882,734518	29.5	17.5	12.0	1
CP_DA220	717024,734506	30.2	17.8	12.1	1
CP_DA218	717055,734503	31.4	18.2	12.3	2
CP_DA160	717097,734499	39.1	20.9	13.9	5
CP_DA53	717136,734835	23.7	16.6	11.5	1
CP_DA20	717495,734782	24.5	16.7	11.6	1

DM (2026)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			No of PM_{10} days > 50 µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
CP_DA19	717504,734795	24.7	16.9	11.7	1
CP_DA21	717448,734786	24.9	16.7	11.6	1
CP_DA18	717485,734796	25.6	17.1	11.8	1
CP_DA17	717455,734799	26.0	17.2	11.9	1

Table 8 Predicted Do-Something Concentrations for Detailed ADMS Model

DS (2026)					
Receptor	Receptor Location (ITM)	Annual Mean Conc. (µg/m³)			No of PM_{10} days > 50 µg/m³
		NO_2	PM_{10}	$PM_{2.5}$	
CP_DA11	717801,734432	35.6	19.7	13.2	3
CP_DA161	717207,734488	33.3	18.7	12.6	2
CP_DA164	717326,734479	31.5	18.1	12.3	2
CP_DA163	717308,734481	31.2	18.0	12.2	2
CP_DA165	717383,734475	30.8	17.8	12.1	1
CP_DA10	717736,734441	31.4	18.1	12.3	2
CP_DA170	717855,734430	31.5	18.1	12.3	2
CP_DA162	717264,734486	30.5	17.7	12.1	1
CP_DA140	716911,734514	31.6	18.2	12.3	2
CP_DA219	716956,734511	31.2	18.0	12.3	2
CP_DA139	716925,734514	30.7	17.8	12.1	1
CP_DA221	716882,734518	30.4	17.7	12.1	1
CP_DA220	717024,734506	31.1	18.0	12.2	2
CP_DA218	717055,734503	32.3	18.4	12.4	2
CP_DA160	717097,734499	39.6	21.0	13.9	5
CP_DA53	717136,734835	21.2	15.5	10.8	<1
CP_DA20	717495,734782	20.5	14.9	10.5	<1
CP_DA19	717504,734795	20.5	14.9	10.5	<1
CP_DA21	717448,734786	20.2	14.5	10.3	<1
CP_DA18	717485,734796	20.3	14.6	10.3	<1
CP_DA17	717455,734799	20.2	14.5	10.3	<1

Table 9 Predicted Changes in Construction DN and DS and Impact Significance Criteria At Worst-Case Receptor Locations for Detailed ADMS Model

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50 µg/m³	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
CP_DA11	717801,734432	1.6	0.4	0.2	0	Slight Adverse	Neutral	Neutral
CP_DA161	717207,734488	1.3	0.3	0.2	0	Slight Adverse	Neutral	Neutral
CP_DA164	717326,734479	1.2	0.3	0.2	1	Slight Adverse	Neutral	Neutral

Receptor	Receptor Location (ITM)	Change in Annual Mean Conc. (µg/m³)			Change in No of PM_{10} days > 50 µg/m³	Impact on Annual Mean Conc.		
		NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$
CP_DA163	717308,734481	1.2	0.3	0.2	1	Slight Adverse	Neutral	Neutral
CP_DA165	717383,734475	1.2	0.3	0.2	0	Slight Adverse	Neutral	Neutral
CP_DA10	717736,734441	1.2	0.3	0.2	1	Slight Adverse	Neutral	Neutral
CP_DA170	717855,734430	1.2	0.3	0.2	1	Slight Adverse	Neutral	Neutral
CP_DA162	717264,734486	1.1	0.3	0.2	0	Slight Adverse	Neutral	Neutral
CP_DA140	716911,734514	1.1	0.2	0.1	0	Slight Adverse	Neutral	Neutral
CP_DA219	716956,734511	1.0	0.2	0.1	1	Slight Adverse	Neutral	Neutral
CP_DA139	716925,734514	1.0	0.2	0.1	0	Slight Adverse	Neutral	Neutral
CP_DA221	716882,734518	1.0	0.2	0.1	0	Slight Adverse	Neutral	Neutral
CP_DA220	717024,734506	0.9	0.2	0.1	1	Slight Adverse	Neutral	Neutral
CP_DA218	717055,734503	0.9	0.2	0.1	0	Slight Adverse	Neutral	Neutral
CP_DA160	717097,734499	0.5	0.1	0.0	0	Slight Adverse	Neutral	Neutral
CP_DA53	717136,734835	-2.5	-1.2	-0.7	<1	Slight Beneficial	Neutral	Neutral
CP_DA20	717495,734782	-4.0	-1.8	-1.1	<1	Slight Beneficial	Neutral	Neutral
CP_DA19	717504,734795	-4.1	-2.0	-1.2	<1	Moderate Beneficial	Neutral	Neutral
CP_DA21	717448,734786	-4.7	-2.2	-1.3	<1	Moderate Beneficial	Slight Beneficial	Neutral
CP_DA18	717485,734796	-5.4	-2.5	-1.5	<1	Moderate Beneficial	Slight Beneficial	Slight Beneficial
CP_DA17	717455,734799	-5.8	-2.7	-1.6	<1	Moderate Beneficial	Slight Beneficial	Slight Beneficial

5.5 Construction Phase Traffic Impacts on Ecology Receptors

5.5.1 Screening Assessment

5.5.1.1 EIAR - Simple DMRB Assessment

Section 12.5.1.3.1 of the EIAR details the areas of sensitive designated ecology within the modelled area using the DMRB screening assessment for the construction phase. The designated habitat within 200m of impacted roads in this area is the Royal Canal pNHA (Site Code: 002103) and Liffey Valley pNHA (Site Code: 000128). The assessment in the EIAR compared the annual mean NO_X concentration to the critical level of 30µg/m³ (including a background of 19 µg/m³) at each of the modelled designated habitat locations (Section 12.5.1.3.1). One site exceeded the NO_x critical level of 30µg/m³. The DS-DM change in critical level was above 1% at a number of modelled locations, therefore the project ecologist was consulted, and no significant concerns were raised. All sites are below the lower critical load for the designated habitat site.

In section 112.5.1.3.1 of the EIAR nitrogen deposition levels have been compared to the lower and higher critical loads for the designated habitat locations. All modelled locations are below the lower critical load for the designated habitat in both the DM and the DS scenarios.

In accordance with the EPA Guidelines (EPA 2022) the ecological likely effects associated with the Construction Phase traffic emissions will overall be *negative, slight and short-term*.

5.5.1.2 Sensitivity Analysis for New 2022 TII Guidance using REM

The sensitivity study of NO_x, ammonia (NH_3) concentrations, nitrogen deposition levels and total acid deposition levels in the worst-case construction year (Table 10) was conducted in line with the updated TII Guidance (TII 2022a). The traffic data, modelling scenarios and ecological receptors remained as detailed within the EIAR for the sensitivity analysis.

The sensitivity study did not model any exceedances of the annual mean NO_x critical level at the Royal Canal pNHA in both the DM and DS scenarios, There are increases in NO_x concentrations due to the Proposed Development at all modelled ecological sensitive locations (Royal Canal pNHA and Liffey Valley pNHA) however the NO_x concentration remains under the critical load and consultation with the project ecologist confirmed that the impacts are not significant.

The 2011 TII guidance (TII 2011) methodology applied within the EIAR previously did not allow for the inclusion of NH_3 which, along with NO_2, is a component of the nutrient nitrogen deposition level. The 2022 TII guidance and REM facilitates the inclusion of NH_3. The result of this more robust modelling methodology is an increase in total nitrogen deposition levels. There are no nitrogen deposition critical loads for canals, rivers or streams, as confirmed with the project ecologist. PE-ENV-01107 (TII 2022b) also specifically states in Section 3.5.2 that it is not necessary to include sites that have been designated as a geological feature or a water course. However, the conservative critical load of 5 kgN/ha/yr for nitrogen deposition has been retained as per the EIAR. 5 kgN/ha/yr is considered the critical load for the most sensitive habitat to nitrogen deposition, according to Air Pollution Information System (APIS) (as recommended as a critical load source by PE-ENV-01107 (TII 2022b)) and agreed with the project ecologist that it is an absolute worst-case scenario. Critical loads are set due to the impact of nitrogen deposition causing changes in species composition and sensitivity of vegetation to environmental stresses, such as drought, frost or insect predation.

The sensitivity study indicates an exceedance of the critical load for nitrogen deposition at the Royal Canal pNHA at Pike Bridge however this impact will be short term in nature. No new exceedances of the critical load were modelled in the sensitivity study above and beyond those reported in the EIAR, for the construction phase of the proposed project in proximity to modelled impacted road links.

In some discreet locations there will be a slight reduction in air quality. With regards to modelled exceedances, these should be viewed with some caution due to a conservative background value for NO_x and NO_2 being utilised. In addition, it should be noted that the impacts modelled only account for road vehicles. The reduction in diesel related rail emissions have not been included within these calculations, which would in reality reduce ambient pollutant concentrations.

In summary, the construction phase road traffic impacts on sensitive ecology, in accordance with the new TII Guidance (2022a), in EIA terms are *negative*, *slight* and *short-term*. This is in keeping with the Section 12.5.1.3.1 of the EIAR.

Table 10 Construction Phase Predicted Nitrogen and Acid Deposition Results at Closest Point within Royal Canal pNHA/Liffey Valley pNHA to Road

Scenario	Predicted Ground Level NO_x Concentration (excluding background Note 1) µg/m³	Predicted Ground Level NH_3 Concentration (excluding background Note 2) µg/m³	Predicted Ground Level NO_x Concentration (including background Note 1) µg/m³	Predicted Ground Level NH_3 Concentration (including background Note 2) µg/m³	Nutrient Nitrogen Deposition (kg/ha/year) (Including ammonia)	Total Acid Deposition (keq/ha/yr)
Royal Canal pNHA (Deey Bridge)						
Maximum predicted ground level concentration						
Do- Minimum	2.39	0.35	21.39	1.35	2.00	0.14
Do- Something	2.59	0.38	21.59	1.38	2.18	0.16

Scenario	Predicted Ground Level NO_x Concentration (excluding background Note 1) µg/m³	Predicted Ground Level NH_3 Concentration (excluding background Note 2) µg/m³	Predicted Ground Level NO_x Concentration (including background Note 1) µg/m³	Predicted Ground Level NH_3 Concentration (including background Note 2) µg/m³	Nutrient Nitrogen Deposition (kg/ha/year) (Including ammonia)	Total Acid Deposition (keq/ha/yr)
Difference between Do-Something and Do-Minimum			0.2	0.03	0.18	0.02
Change relative to lower critical load (%)			0.7%	3.0%	4%	0.00
Royal Canal pNHA (R149) West of Kilcock						
Maximum predicted ground level concentration						
Do- Minimum	2.64	0.38	21.64	1.38	2.18	0.16
Do- Something	3.24	0.55	22.24	1.55	3.11	0.22
Difference between Do-Something and Do-Minimum			0.6	0.17	0.93	0.06
Change relative to lower critical load (%)			2.0%	17.0%	19%	0.00
Royal Canal pNHA (L5041) Millfarm						
Maximum predicted ground level concentration						
Do- Minimum	0.11	0.01	19.11	1.01	0.06	0.00
Do- Something	0.11	0.02	19.11	1.02	0.11	0.01
Difference between Do-Something and Do-Minimum			0	0.01	0.05	0.01
Change relative to lower critical load (%)			0.0%	1.0%	1%	0.00
Royal Canal pNHA (L5041) Laraghbryan						
Maximum predicted ground level concentration						
Do- Minimum	1.42	1.42	20.42	2.42	1.15	0.08
Do- Something	1.64	1.64	20.64	2.64	1.47	0.11
Difference between Do-Something and Do-Minimum			0.22	0.22	0.32	0.03
Change relative to lower critical load (%)			0.7%	22.0%	6%	0.00
Royal Canal pNHA (Pike Bridge)						
Maximum predicted ground level concentration						
Do- Minimum	7.20	1.13	26.20	2.13	6.43	0.46
Do- Something	7.49	1.23	26.49	2.23	6.97	0.50
Difference between Do-Something and Do-Minimum			0.29	0.1	0.54	0.04
Change relative to lower critical load (%)			1.0%	29.0%	11%	0.00
Royal Canal pNHA (Collins Bridge) and Liffey Valley pNHA (Lucan)						
Maximum predicted ground level concentration						
Do- Minimum	5.67	0.79	24.67	1.79	4.54	0.32
Do- Something	5.93	0.85	24.93	1.85	4.87	0.35
Difference between Do-Something and Do-Minimum			0.26	0.06	0.33	0.03
Change relative to lower critical load (%)			0.9%	26.0%	7%	0.00

Note 1 A NO_x background concentration of 19 µg/m³ added to modelled road contribution.

Note 2 A NH_3 background concentration of 1 µg/m³ added to modelled road contribution.

5.5.2 Detailed ADMS Assessment

5.5.2.1 EIAR

Section 12.5.1.3.2 of the EIAR details the modelled ecology receptors and traffic data for the detailed dispersion impact assessment which was in the region of Spencer Dock. The designated ecology within 200m of impacted roads in this area is the Royal Canal pNHA (Site Code: 002103). The assessment in the EIAR compared the annual mean NO_X concentration to the critical level of 30µg/m^3 at each of the modelled designated habitat locations (Section 12.5.1.3.2).

The annual mean NO_X concentration has been compared to the critical level of 30µg/m^3 at each of the designated habitat sites (pNHAs). The predicted concentration of mean annual NOx at the Royal Canal for all sections modelled exceed the critical level for NO_X. There is a contribution at some intersections with the Royal Canal pNHA Hanover Quay/South of Guild Street and Royal Canal pNHA at North of Sheriff Street due to the proposed development of above 1% of the critical level. Therefore, the project ecologist was consulted however as the critical load for nitrogen deposition was not exceeded no significant concerns were raised.

In accordance with the EPA Guidelines (EPA 2022) the ecological likely effects associated with the Construction Phase traffic emissions will overall be *negative, slight and short-term*.

5.5.2.2 Sensitivity Analysis for New 2022 TII Guidance using REM and ADMS

The sensitivity study of NO_x and nitrogen deposition levels and total acid deposition levels in the worst-case construction year of 2026 (Table 12) was conducted in line with the updated TII Guidance (TII 2022a). As with the human receptors, the traffic data, modelling scenarios and receptors remained as detailed within the EIAR, the only difference was the use of the REM rather than EFT to calculated the emissions from road links. Road traffic emission rates for NH_3 were generated using the best available method at the time of undertaking the assessment, namely the Calculator for Road Emissions of Ammonia (CREAM) Tool developed by Air Quality Consultants (AQC, 2020), as recommended by TII (TII, 2022a). The NH_3 emissions were then added to ADMS for inclusion in the model.

Nitrogen deposition levels have been compared to the lower and higher critical loads for the designated habitat sites in Table 12. The methodology is adjusted from the screening model due to the use of the ADMS model. In order to calculate the nitrogen deposition, the NO_X / NO_2 concentration determined through modelling including the background concentration must be converted firstly into a dry deposition flux using the equation below which is taken from UK Environment Agency publication 'AGTAG06 – Technical Guidance on Detailed Modelling Approach For An Appropriate Assessment For Emissions To Air' (EA, 2014):

Dry deposition flux (µg/m^2/s) = ground-level concentration (µg/m^3) x deposition velocity (m/s)

Deposition velocities are provided in both the TII (TII, 2022a) and AGTAG06 (EA, 2014) guidance for NO_2 and NH_3 in grassland and forestry. Once the dry deposition flux (µg/m^2/s) is calculated it must then be converted to nitrogen deposition and nitrogen equivalent acidification flux (keq/ha/year, where keq is a unit of equivalents (a measure of how acidifying the chemical species can be) for comparison with critical loads.

In order to convert the dry deposition flux from units of µg/m^2/s to units of nitrogen deposition (kg/ha/year) the dry deposition flux is multiplied by the conversion factors shown in Table 11, and provided in AGTAG06 (EA, 2014). For NO_2 this factor is 95.9 and for NH_3 the factor is 260.

Nitrogen (N) deposition (kg/ha/yr) = Dry deposition flux (µg/m^2/s) x N deposition conversion factor

In order to convert the dry deposition flux from units of µg/m^2/s to units of acid deposition (keq/ha/year) the dry deposition flux is multiplied by the conversion factors shown in Table 11, and provided AGTAG06 (EA, 2014). For NO_2 this factor is 6.84 and for NH_3 the factor is 18.5.

Acid (N) deposition (keq/ha/yr) = Dry deposition flux (µg/m^2/s) x Acid deposition conversion factor

Nitrogen deposition and acid deposition is calculated in this manner for both NO_2 and NH_3, and these are then summed for total nitrogen deposition and acid deposition at each sensitive designated habitat.

Table 11 Dry Deposition, Nitrogen and Acid Deposition Fluxes for NO_2 and NH_3

Chemical Species	Habitat Type	Recommended Deposition Velocity (m/s)	Dry Deposition Flux (µg/m²/s) Conversion Factor to N Deposition Flux (kg/ha/yr)	Dry Deposition Flux (µg/m²/s) Conversion Factor to Acid Deposition Flux (keq/ha/yr)
NO_2 (as N)	Grassland	0.0015	95.9	6.84
NH_3 (as N)	Grassland	0.02	260	18.5

The annual mean NO_X concentration has been compared to the critical level of 30µg/m³ at each of the designated habitat sites (pNHAs) (Table 12). The predicted concentration of mean annual NOx at the Royal Canal for all sections modelled exceed the critical level for NO_X. This is consistent with the EIAR findings. A maximum decrease of 39% of the critical NO_x concentration has been modelled at Sheriff Street intersection with the Royal Canal pNHA due of the rerouting of traffic. This is a significant decrease in concentrations, but impacts will be short-term. Short-term adverse impacts of 15.3% of the critical NO_x concentration are also modelled at the Royal Canal pNHA at Hanover Quay. The project ecologist was consulted however as the critical load for nitrogen deposition was not exceeded no significant concerns were raised.

The 2011 TII guidance (TII 2011) methodology applied within the EIAR previously did not allow for the inclusion of NH_3 which, along with NO_2, is a component of the nutrient nitrogen deposition level. The 2022 TII guidance facilitates the inclusion of NH_3. The result of this more robust modelling methodology is an increase in total nitrogen deposition levels. There are no nitrogen deposition critical levels for canals, rivers or streams, as confirmed with the project ecologist. PE-ENV-01107 (TII 2022b) also specifically states in Section 3.5.2 that it is not necessary to include sites that have been designated as a geological feature or a water course. However, the conservative critical load of 5 kgN/ha/yr for nitrogen deposition has been retained as per the EIAR. 5 kgN/ha/yr is considered the critical load for the most sensitive habitat to nitrogen deposition, according to Air Pollution Information System (APIS) (as recommended as a critical load source by PE-ENV-01107 (TII 2022b)) and agreed with the project ecologist that it is an absolute worst-case scenario. Critical loads are set due to the impact of nitrogen deposition causing changes in species composition and sensitivity of vegetation to environmental stresses, such as drought, frost or insect predation. The sensitivity study indicates an exceedance of the critical load for nitrogen deposition at all locations Royal Canal pNHA. These exceedances have been highlighted to the project ecologist, none of these exceedances occur due to the proposed development.

In some discreet locations there will be a slight reduction in air quality in the short-term, although there are improvements at other locations. In addition, it should be noted that the impacts modelled only account for road vehicles. The reduction in diesel related rail emissions have not been included within these calculations, which would in reality reduce ambient pollutant concentrations at some of the modelled locations (Newcomen Bridge).

In accordance with the EPA Guidelines (EPA 2022) the ecological likely effects associated with the Construction Phase traffic emissions will be both *positive and negative, slight and short-term*.

Table 12 Predicted Nitrogen and Acid Deposition Results at Closest Point within Ecological Sites to Road

Scenario	Predicted Ground Level NOX Concentration (excluding background) µg/m³	Predicted Ground Level NH3 Concentration (excluding background) µg/m³	Predicted Ground Level NOX Concentration (including background) µg/m³	Predicted Ground Level NH3 Concentration (including background) µg/m³	Total Nitrogen Deposition Flux (kg/ha/yr)	Total Acid Deposition Flux (keq/ha/yr)
Royal **Canal pNHA (Hanover Quay/South of Guild Street)**						
Maximum predicted ground level concentration						
Do- Minimum	45.41	1.82	73.51	2.82	20.26	1.44
Do- Something	50.00	1.94	78.10	2.94	21.12	1.50
Difference between Do-Something and Do-Minimum	4.59	0.12	4.59	0.12	0.86	0.06
Change relative to lower critical load (%)	15.3%	0.4%	15.3%	0.4%	2.9%	0.2%
Royal **Canal pNHA (North of Guild Street)**						
Maximum predicted ground level concentration						
Do- Minimum	5.12	0.61	33.22	1.61	11.56	0.82
Do- Something	5.27	0.62	33.37	1.62	11.61	0.83
Difference between Do-Something and Do-Minimum	0.14	0.01	0.14	0.01	0.05	0.00
Change relative to lower critical load (%)	0.5%	0.0%	0.5%	0.0%	0.2%	0.0%
Royal **Canal pNHA (North of Sheriff Street)**						
Maximum predicted ground level concentration						
Do- Minimum	13.81	0.86	41.91	1.86	13.42	0.96
Do- Something	2.12	0.25	30.22	1.25	9.50	0.68
Difference between Do-Something and Do-Minimum	-11.69	-0.60	-11.69	-0.60	-3.92	-0.28
Change relative to lower critical load (%)	-39.0%	-2.0%	-39.0%	-2.0%	-13.1%	-0.9%
Royal **Canal pNHA (East of Newcomen Bridge)**						
Maximum predicted ground level concentration						
Do- Minimum	14.48	1.78	42.58	2.78	18.24	1.30
Do- Something	16.01	1.95	44.11	2.95	19.27	1.37
Difference between Do-Something and Do-Minimum	1.54	0.18	1.54	0.18	1.02	0.07
Change relative to lower critical load (%)	5.1%	0.6%	5.1%	0.6%	3.4%	0.2%

Scenario	Predicted Ground Level NOX Concentration (excluding background) µg/m³	Predicted Ground Level NH3 Concentration (excluding background) µg/m³	Predicted Ground Level NOX Concentration (including background) µg/m³	Predicted Ground Level NH3 Concentration (including background) µg/m³	Total Nitrogen Deposition Flux (kg/ha/yr)	Total Acid Deposition Flux (keq/ha/yr)
Royal **Canal pNHA (West of Newcomen Bridge)**						
Maximum predicted ground level concentration						
Do- Minimum	13.20	1.62	41.30	2.62	17.35	1.24
Do- Something	14.61	1.78	42.71	2.78	18.28	1.30
Difference between Do-Something and Do-Minimum	1.40	0.16	1.40	0.16	0.93	0.07
Change relative to lower critical load (%)	4.7%	0.5%	4.7%	0.5%	3.1%	0.2%

Note: Two decimal places have been provided where required in order to provide clarity of results.

5.6 Summary

In summary, the construction phase road traffic impacts on sensitive human and ecology receptors, in accordance with the new TII Guidance (2022a), are overall *not significant* in EIA terms. This is consistent with the impacts reported in Section 12.5.2 of the EIAR.

6. OPERATIONAL PHASE TRAFFIC ASSESSMENT

6.1 Introduction

In December 2022 Transport Infrastructure Ireland (TII) published new guidance documents and standards for the EIAR with respect to Air Quality:

- PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects (TII 2022a);
- PE-ENV-01107: Air Quality Assessment Standard for Proposed National Roads (TII 2022b).

These guidance documents were issued in December 2022 and supersede the 2011 Transport Infrastructure Ireland '*Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes'*, or 2011 TII Air Quality Guidelines. The methodology for assessing national roads and other specified infrastructure projects, such as light rail, in PE-ENV-01106 is based on methodology employed in the UK, namely Highways England 2019 guidance *'Design Manual for Roads and Bridges (DMRB) LA 105'* (an older version is referred to in the 2011 TII Air Quality Guidelines) and the UK Department for Environment Food & Rural Affairs (DEFRA) 2022 *'Local Air Quality Management, Technical Guidance LAQM.TG(22)'*. LA 105 and the 2011 TII Air Quality Guidelines were used as the basis of the air quality assessment within the EIAR.

Section 1.9 of PE-ENV-01107 (Air Quality Assessment Standard for Proposed National Roads) states that:

'where projects requiring approval under Section 51, Section 177AE or Part 8 have, at the date of publication of this SD, commenced planning and design, and in particular, where technical advisor contracts have been executed, this *SD should be:*

- treated as advice and guidance;
- employed to the greatest extent reasonably practicable; and
- applied in a proportionate manner, having regard to the characteristics and location of the project/maintenance works and the type and characteristics of potential impacts.'

The air quality competent expert was appointed in 2020, wherein scope and methodology were agreed. At the date of publication of the updated guidance all air quality assessments were complete, and the EIAR was submitted. As per Section 1.9 of PE-ENV-01107 given above, it was therefore considered reasonably practicable to retain the use of previous guidance published prior to the submission of the EIAR.

It is noted that, Córas Iompair Éireann, hereafter referred to as CIÉ or 'the Applicant', is applying to An Bord Pleanála for a Railway Order ("RO") for the DART+ West project ("the proposed project" or "proposed development") under the Transport (Railway Infrastructure) Act 2001 (as amended and substituted) ('the 2001 Act"). Although, the statutory requirements for a Railway Order application and the requirement to prepare an EIAR arises under the 2001 Act and the EIA Directive, the Air Quality Assessment Standard for Proposed National Roads guidance has been applied.

In order to ensure no additional impacts occur as a result of the guidance update, AWN Consulting have conducted a sensitivity analysis of the traffic impacts by remodelling the operational phase traffic data using the 2022 TII guidance methodology and assessed the impacts using the updated significance outlined in PE-ENV-01106. This technical note details the outputs of the sensitivity analysis.

6.2 Methodology Updates

The TII guidance (TII, 2022a) states that the following scoping criteria shall be used to determine whether the air quality impacts can be scoped out or require an assessment, based on the changes between the Do

Something traffic (with the proposed development) compared to the Do Minimum traffic (without the proposed development):

- Road alignment will change by 5 m or more; or
- Annual average daily traffic (AADT) flows will change by 1,000 or more; or
- Heavy duty vehicle (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more; or
- Daily average speed change by 10 kph or more; or
- Peak hour speed will change by 20 kph or more.

The above scoping criteria are in alignment with the previous LA 105 - Air Quality scoping criteria (UKHA 2019) set out in Section 12.3.5 of the EIAR. Therefore, no changes to the impacted traffic links are proposed as part of the sensitivity analysis.

Chapter 12, Section 12.3.5.1.1 and 12.3.5.1.2 of the EIAR details the procedure for the screening assessment and detailed assessment of local road traffic respectively. The screening assessment was deemed suitable for the operational phase traffic impacts and utilised the UKHA DMRB model (UKHA 2019). In acknowledgement of the DMRB air quality spreadsheet limitations, LA 105 - Air Quality (UKHA 2019) states that the DMRB spreadsheet tool may still be used for simple air quality assessments where it is deemed unlikely to lead to a breach of the air quality standards. Due to its use of an older and thus 'dirtier' fleet, vehicle emissions levels would be higher than more modern models and therefore any results will be conservative in nature and will provide a worst-case assessment of potential adverse impacts.

The new TII guidance (TII, 2022a) was published with an associated Roads Emission Model (REM) (TII, 2022c). The REM generates road traffic emission rates for NO_X, PM_{10} and $PM_{2.5}$ which are derived using traffic data for the baseline year of 2019, opening year of 2028 and the design year of 2043 provided. The TII REM tool incorporates emission factors from the COPERT V database (EMISIA, 2020). The traffic volumes, assessment years and receptors (human and ecology) have not been altered from those detailed in Section 12.5.1.7 and Section 12.5.1.8 of the EIAR.

The following inputs are required for the REM tool: receptor locations, light duty vehicle (LDV) annual average daily traffic movements (AADT), annual average daily heavy-duty vehicles (HDV AADT), annual average traffic speeds, road link lengths, road type, project county location and pollutant background concentrations. The Default fleet mix option was selected along with the Intermediate Case fleet data base selection, as per TII Guidance (TII, 2022c). The Intermediate Case assumes a linear interpolation between the Business-as-Usual case – where current trends in vehicle ownership continue and the Climate Action Plan (CAP) case – where adoption of low emission light duty vehicles occurs. 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, 2022c).

Road traffic emission rates for NH_3 were generated using the best available method at the time of undertaking the assessment, namely the Calculator for Road Emissions of Ammonia (CREAM) Tool developed by Air Quality Consultants (AQC, 2020), as recommended by TII (TII, 2022a).

6.2.1 Significance Criteria Updates

The significance criteria given in the 2011 TII Air Quality Guidelines (Boxes A10.1, A10.2 and A10.3) were employed in the DART+ West air quality assessment (see Section 12.3.6.1 Chapter 12 Air Quality of the EIAR). These criteria are based on absolute concentrations – both the magnitude of change due to the scheme and also the modelled concentration relative to the limit value. Table 13 (reproduced from Boxes A10.1 and A10.2 of 2011 TII Air Quality Guidelines) demonstrates that a substantial adverse impact at a modelled receptor would occur if the modelled nitrogen dioxide (NO_2) concentration at that receptor was above the limit value of 40 µg/m^3 combined with a change in concentration due to the scheme of more than 4 µg/m^3.

Table 13 TII 2011 Air Quality Guidelines – Significance Criteria (reproduced from Boxes A10.1 and A10.2)

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration		
	Small (Increase of 0.4 - <2 µg/m^3)	Medium (Increase of 2 - <4 µg/m^3)	Large (Increase of ≥4 µg/m^3)
Increase with Scheme			
Above Objective/Limit Value With Scheme (≥40 µg/m^3 of NO_2 or PM_{10}) (≥25µg/m^3 of $PM_{2.5}$)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value With Scheme (36-<40 µg/m^3 of NO_2 or PM_{10}) (22.5-<25 µg/m^3 of $PM_{2.5}$)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme (30-<36 µg/m^3 of NO_2 or PM_{10}) (18.75-<22.5 µg/m^3 of $PM_{2.5}$)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value With Scheme (<30 µg/m^3 of NO_2 or PM_{10}) (<18.75 µg/m^3 of $PM_{2.5}$)	Negligible	Negligible	Slight Adverse

The updated significance criteria in PE-ENV-01106 are based on modelled concentrations as a percentage of the air quality limit value (AQLV), as shown in Table 14 below. The impact categories differ from those in the 2011 TII Air Quality Guidelines in that they relate to percentages of the AQLV and therefore have the potential to change with future changes to AQLVs. A neutral effect is a change in concentration at a receptor of:

- 5% or less where the opening year, without the proposed scheme annual mean concentration is 75% or less of the standard; or
- 1% or less where the opening year, without the proposed scheme annual mean concentration is 94% or less of the standard.

Substantial adverse impacts may now occur under more conditions, as shown in 13, relative to the one substantial impact category in the 2011 TII Air Quality Guidelines.

Table 14 TII 2022 PE-ENV-01107 Significance Criteria (reproduced from Table 3.21 Impact Descriptors)

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Limit Value (AQLV)			
	1	2-5	6-10	>10
75% or less of AQLV	Neutral	Neutral	Slight	Moderate
76 – 94% of AQLV	Neutral	Slight	Moderate	Moderate
95 – 102% of AQLV	Slight	Moderate	Moderate	Substantial
103 – 109% of AQLV	Moderate	Moderate	Substantial	Substantial
110% or more of AQLV	Moderate	Substantial	Substantial	Substantial

6.3 Impact Assessment

The air dispersion modelling assessment for operational phase road traffic using contained within Chapter 12 of the EIAR (Section 12.5.1.6) for road traffic impacts found that in 2028 and 2043 all receptors will have ambient air quality in compliance with the ambient air quality standards for the Do Something (and Do Nothing) scenario. There are no slight, moderate or substantial adverse effects expected as a result of the operational phase of the proposed development. This is detailed in Section 12.5.1.6, with impacts on human receptors discussed in Section 12.5.1.7 and ecological receptors discussed in Section 12.5.1.8 of the EIAR.

Using the same traffic data, assessment years and receptors the assessment has been completed using the TII REM (TII 2022c) as per PE-ENV-01106 (TII 2022a).

6.3.1 Operational Traffic Impacts on Human Receptors

6.3.1.1 Area 1: Ashtown

6.3.1.1.1 EIAR

Section 12.5.1.7.1 of the EIAR details the modelled air quality receptors and traffic data for the Ashtown area of impact. The outcome of the assessment in the EIAR found that the impact of the proposed development in terms of NO_2, PM_{10} and $PM_{2.5}$ is considered negligible. In accordance with the 2011 TII Air Quality Guidelines, the overall impact of NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of the proposed development is *long-term*, *negative* and *imperceptible*. In accordance with the EPA Guidelines (EPA, 2022) the likely effects associated with the operational phase traffic emissions pre-mitigation are both *negative* and *positive* but *not significant* and *long-term*.

6.3.1.1.2 Sensitivity Analysis for New 2022 TII Guidance

The results of the sensitivity assessment of the impact of the proposed development on NO_2, PM_{10} and $PM_{2.5}$ in the opening year 2028 and design year 2043 in line with the updated TII Guidance (TII 2022a) are shown in Table 15 to Table 17. In keeping with the EIAR, the annual average concentration is in compliance with the relevant EU limit value at all worst-case receptors in 2028 and 2043. Modelled concentrations of NO_2, PM_{10} and $PM_{2.5}$ in 2028 and 2043 are at most 56%,42% and 40% of their respective annual limit values. The hourly limit value for NO_2 is 200 µg/m^3 and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The maximum 1-hour NO_2 concentration is not predicted to be exceeded in any modelled year.

The outcome of the sensitivity study in Table 15 to Table 17 below found that the impact of the proposed development in terms of NO_2, PM_{10} and $PM_{2.5}$ remains consistent with the impact within the EIAR, with no significant impacts. All impacts are considered neutral in accordance with PE-ENV-01106 (TII 2022a), as the changes in concentration are 5% or less and in the opening year Do Nothing scenario the annual mean concentration is 75% or less of the AQLV. In accordance with the EPA Guidelines (EPA, 2022) the likely effects associated with the Operational Phase traffic emissions pre-mitigation are both *negative* and *positive*, but *not significant* and *long-term*.

In summary, the operational phase road traffic impacts, in accordance with the new TII Guidance (2022a), in EIA terms are overall *not significant*. This is in keeping with the Section 12.5.1.7.1 of the EIAR.

In addition to the results detailed in Table 15, 16 and 17 a further sensitivity check has been conducted for the WHO air quality guidance interim target value in 2026 for the opening year (see Table 1). This found that the significance of impacts (Table 3) remained neutral at all modelled receptors for NO_2, PM_{10} and $PM_{2.5}$ for the opening year. Should the WHO limit values become the legal limit values in Ireland the impact of mitigation put in place in order to achieve them would likely improve air quality. Improvements in background concentrations have not considered as part of the analysis and therefore the impacts for the design year when the WHO have significantly lower targets are undetermined. An improvement in background air quality has the potential to result in a lower impact due to the assignment of significance (see Table 3).

Table 15 Predicted Annual Mean NO_2 Concentrations for Area 1: Ashtown

Annual Mean NO_2 Concentrations (µg/m^3)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
1	19.8	19.5	-0.33	-0.82%	Neutral	19.4	19.3	-0.18	-0.45%	Neutral

Annual Mean NO_2 Concentrations ($\mu g/m^3$)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
2	21.2	21.8	0.66	1.65%	Neutral	20.2	20.5	0.30	0.75%	Neutral
3	21.3	21.3	0.01	0.03%	Neutral	20.2	20.2	0.02	0.05%	Neutral
4	20.2	19.3	-0.83	-2.08%	Neutral	19.7	19.2	-0.47	-1.18%	Neutral
5	20.6	20.4	-0.20	-0.50%	Neutral	19.8	19.7	-0.12	-0.30%	Neutral
6	21.0	20.7	-0.25	-0.63%	Neutral	20.0	19.9	-0.15	-0.38%	Neutral
7	22.0	21.9	-0.09	-0.23%	Neutral	20.5	20.5	-0.06	-0.15%	Neutral
8	21.7	21.6	-0.09	-0.23%	Neutral	20.4	20.3	-0.06	-0.15%	Neutral
9	21.7	21.6	-0.09	-0.23%	Neutral	20.4	20.3	-0.06	-0.15%	Neutral
10	20.9	20.9	-0.06	-0.15%	Neutral	20.0	20.0	-0.04	-0.10%	Neutral
11	20.6	20.5	-0.06	-0.15%	Neutral	19.8	19.8	-0.03	-0.07%	Neutral
12	19.9	20.0	0.15	0.38%	Neutral	19.4	19.5	0.07	0.18%	Neutral
13	20.6	20.9	0.33	0.83%	Neutral	19.7	19.9	0.14	0.35%	Neutral
14	20.8	21.2	0.38	0.95%	Neutral	19.8	20.0	0.16	0.40%	Neutral
15	21.9	22.3	0.35	0.87%	Neutral	20.4	20.6	0.11	0.27%	Neutral
16	21.9	22.0	0.06	0.15%	Neutral	20.4	20.5	0.01	0.02%	Neutral
17	21.7	21.6	-0.12	-0.30%	Neutral	20.5	20.3	-0.16	-0.40%	Neutral
18	21.5	21.4	-0.13	-0.32%	Neutral	20.4	20.2	-0.19	-0.47%	Neutral
19	21.4	21.2	-0.12	-0.30%	Neutral	20.3	20.1	-0.18	-0.45%	Neutral
20	22.4	22.3	-0.15	-0.38%	Neutral	20.9	20.7	-0.21	-0.52%	Neutral
21	20.7	20.8	0.12	0.30%	Neutral	19.9	20.0	0.09	0.23%	Neutral
22	20.9	21.0	0.13	0.33%	Neutral	20.0	20.1	0.10	0.25%	Neutral
23	21.2	21.3	0.16	0.40%	Neutral	20.2	20.3	0.11	0.27%	Neutral
24	20.1	20.1	0.06	0.15%	Neutral	19.7	19.8	0.15	0.37%	Neutral
25	20.5	20.6	0.08	0.20%	Neutral	19.9	20.1	0.19	0.48%	Neutral
26	20.1	20.1	0.06	0.15%	Neutral	19.7	19.8	0.15	0.37%	Neutral
27	20.6	20.7	0.10	0.25%	Neutral	19.9	19.9	0.07	0.18%	Neutral
28	19.3	20.5	1.21	3.03%	Neutral	19.1	19.8	0.63	1.58%	Neutral

Table 16 Predicted Annual Mean PM_{10} Concentrations for Area 1: Ashtown

Annual Mean PM_{10} Concentrations ($\mu g/m^3$)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
1	13.9	13.5	-0.35	-0.87%	Neutral	13.9	13.5	-0.41	-1.03%	Neutral
2	15.2	15.8	0.66	1.65%	Neutral	15.3	15.9	0.60	1.50%	Neutral
3	15.5	15.6	0.04	0.10%	Neutral	15.6	15.6	0.03	0.07%	Neutral
4	14.2	13.3	-0.82	-2.05%	Neutral	14.3	13.3	-0.92	-2.30%	Neutral
5	14.7	14.5	-0.24	-0.60%	Neutral	14.8	14.5	-0.28	-0.70%	Neutral
6	15.2	14.9	-0.30	-0.75%	Neutral	15.2	14.9	-0.35	-0.88%	Neutral

Annual Mean PM_{10} Concentrations ($\mu g/m^3$)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
7	15.9	15.8	-0.10	-0.25%	Neutral	15.9	15.8	-0.13	-0.32%	Neutral
8	15.7	15.6	-0.09	-0.23%	Neutral	15.7	15.6	-0.13	-0.33%	Neutral
9	15.7	15.6	-0.09	-0.23%	Neutral	15.7	15.6	-0.13	-0.33%	Neutral
10	14.9	14.8	-0.07	-0.18%	Neutral	14.9	14.8	-0.09	-0.23%	Neutral
11	14.5	14.5	-0.05	-0.12%	Neutral	14.5	14.5	-0.07	-0.17%	Neutral
12	13.8	13.9	0.14	0.35%	Neutral	13.7	13.8	0.10	0.25%	Neutral
13	14.4	14.7	0.29	0.73%	Neutral	14.3	14.5	0.24	0.60%	Neutral
14	14.6	15.0	0.34	0.85%	Neutral	14.4	14.7	0.27	0.67%	Neutral
15	15.7	16.0	0.32	0.80%	Neutral	15.6	15.8	0.18	0.45%	Neutral
16	15.9	15.9	0.06	0.15%	Neutral	15.8	15.8	0.01	0.02%	Neutral
17	15.7	15.6	-0.12	-0.30%	Neutral	15.9	15.6	-0.33	-0.83%	Neutral
18	15.6	15.4	-0.15	-0.38%	Neutral	15.8	15.4	-0.40	-1.00%	Neutral
19	15.4	15.3	-0.14	-0.35%	Neutral	15.6	15.3	-0.38	-0.95%	Neutral
20	16.5	16.4	-0.16	-0.40%	Neutral	16.8	16.3	-0.44	-1.10%	Neutral
21	14.6	14.7	0.09	0.23%	Neutral	14.7	14.8	0.16	0.40%	Neutral
22	14.8	14.9	0.10	0.25%	Neutral	14.9	15.1	0.18	0.45%	Neutral
23	15.1	15.3	0.13	0.32%	Neutral	15.2	15.4	0.20	0.50%	Neutral
24	14.1	14.1	0.06	0.15%	Neutral	14.3	14.6	0.27	0.67%	Neutral
25	14.5	14.6	0.08	0.20%	Neutral	14.9	15.2	0.35	0.87%	Neutral
26	14.1	14.1	0.06	0.15%	Neutral	14.3	14.6	0.27	0.67%	Neutral
27	14.6	14.7	0.08	0.20%	Neutral	14.7	14.8	0.13	0.32%	Neutral
28	13.3	14.6	1.30	3.25%	Neutral	13.3	14.6	1.33	3.33%	Neutral

Table 17 Predicted Annual Mean $PM_{2.5}$ Concentrations for Area 1: Ashtown

Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
1	8.5	8.3	-0.20	-0.50%	Neutral	8.5	8.3	-0.23	-0.58%	Neutral
2	9.2	9.6	0.38	0.95%	Neutral	9.3	9.6	0.34	0.85%	Neutral
3	9.4	9.4	0.03	0.07%	Neutral	9.4	9.4	0.02	0.05%	Neutral
4	8.6	8.2	-0.45	-1.13%	Neutral	8.7	8.2	-0.50	-1.25%	Neutral
5	9.0	8.8	-0.13	-0.32%	Neutral	9.0	8.8	-0.15	-0.38%	Neutral
6	9.2	9.0	-0.17	-0.43%	Neutral	9.2	9.0	-0.19	-0.48%	Neutral
7	9.6	9.6	-0.06	-0.15%	Neutral	9.6	9.6	-0.07	-0.17%	Neutral
8	9.5	9.5	-0.05	-0.13%	Neutral	9.5	9.4	-0.07	-0.18%	Neutral
9	9.5	9.5	-0.05	-0.13%	Neutral	9.5	9.4	-0.07	-0.18%	Neutral
10	9.1	9.0	-0.03	-0.08%	Neutral	9.1	9.0	-0.05	-0.13%	Neutral
11	8.9	8.8	-0.03	-0.07%	Neutral	8.8	8.8	-0.04	-0.10%	Neutral

Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
12	8.4	8.5	0.08	0.20%	Neutral	8.4	8.5	0.07	0.17%	Neutral
13	8.8	9.0	0.16	0.40%	Neutral	8.7	8.8	0.14	0.35%	Neutral
14	8.9	9.1	0.19	0.47%	Neutral	8.8	8.9	0.15	0.38%	Neutral
15	9.5	9.7	0.18	0.45%	Neutral	9.4	9.5	0.10	0.25%	Neutral
16	9.6	9.6	0.03	0.08%	Neutral	9.5	9.5	0.00	0.00%	Neutral
17	9.5	9.5	-0.07	-0.18%	Neutral	9.6	9.4	-0.19	-0.47%	Neutral
18	9.4	9.3	-0.08	-0.20%	Neutral	9.5	9.3	-0.22	-0.55%	Neutral
19	9.4	9.3	-0.08	-0.20%	Neutral	9.5	9.2	-0.21	-0.52%	Neutral
20	10.0	9.9	-0.09	-0.23%	Neutral	10.1	9.8	-0.24	-0.60%	Neutral
21	8.9	9.0	0.05	0.13%	Neutral	8.9	9.0	0.09	0.23%	Neutral
22	9.0	9.1	0.06	0.15%	Neutral	9.0	9.1	0.10	0.25%	Neutral
23	9.2	9.3	0.07	0.18%	Neutral	9.2	9.3	0.11	0.27%	Neutral
24	8.6	8.6	0.03	0.07%	Neutral	8.7	8.9	0.16	0.40%	Neutral
25	8.8	8.9	0.05	0.13%	Neutral	9.0	9.2	0.20	0.50%	Neutral
26	8.6	8.6	0.03	0.07%	Neutral	8.7	8.9	0.16	0.40%	Neutral
27	8.9	9.0	0.05	0.12%	Neutral	8.9	9.0	0.08	0.20%	Neutral
28	8.2	8.9	0.71	1.78%	Neutral	8.2	8.9	0.72	1.80%	Neutral

6.3.1.2 Area 2: Coolmine/Clonsilla

6.3.1.2.1 EIAR

Section 12.5.1.7.2 of the EIAR details the modelled air quality receptors and traffic data for the Coolmine/Clonsilla area of impact. The outcome of the assessment in the EIAR found that the impact of the proposed development in terms of NO_2, PM_{10} and $PM_{2.5}$ is considered negligible. In accordance with the 2011 TII Air Quality Guidelines, the overall impact of NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of the proposed development is *long-term*, *negative* and *imperceptible*. In accordance with the EPA Guidelines (EPA, 2022) the likely effects associated with the operational phase traffic emissions pre-mitigation are both *negative* and *positive* but *not significant* and *long-term*.

6.3.1.2.2 Sensitivity Analysis for New 2022 TII Guidance

The results of the sensitivity assessment of the impact of the proposed development on NO_2, PM_{10} and $PM_{2.5}$ in the opening year 2028 and design year 2043 in line with the updated TII Guidance (TII 2022a) are shown in Table 18 to Table 20. In keeping with the EIAR, the annual average concentration is in compliance with the appropriate EU limit value at all worst-case receptors in 2028 and 2043. Modelled concentrations of NO_2, PM_{10} and $PM_{2.5}$ in 2028 and 2043 are at most 54%,39% and 38% of their respective annual limit values. The hourly limit value for NO_2 is 200 $\mu g/m^3$ and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The maximum 1-hour NO_2 concentration is not predicted to be exceeded in any modelled year.

The outcome of the sensitivity study in Table 18 to Table 20 below found that the impact of the proposed development in terms of NO_2, PM_{10} and $PM_{2.5}$ remains consistent with the impact within the EIAR, with no significant impacts. All impacts are considered neutral in accordance with PE-ENV-01106 (TII 2022a), as the changes in concentration are 5% or less and in the opening year Do Nothing scenario the annual mean concentration is 75% or less of the AQLV. In accordance with the EPA Guidelines (EPA, 2022) the likely effects

associated with the Operational Phase traffic emissions pre-mitigation are both *negative* and *positive*, but *not significant* and *long-term*.

In summary, the operational phase road traffic impacts, in accordance with the new TII Guidance (2022a), in EIA terms are overall *not significant*. This is in keeping with the Section 12.5.1.7.2 of the EIAR.

In addition to the results detailed in Table 18, 19 and 20 a further sensitivity check has been conducted for the WHO air quality guidance interim target value in 2026 for the opening year (see Table 1). This found that the significance of impacts (Table 3) remained neutral at all modelled receptors for NO_2, PM_{10} and $PM_{2.5}$ for the opening year with the exception of three slight adverse impacts for NO_2 and two slight adverse impacts for $PM_{2.5}$. Should the WHO limit values become the legal limit values in Ireland the impact of mitigation put in place in order to achieve them would likely improve air quality. Improvements in background concentrations have not considered as part of the analysis and therefore the impacts for the design year when the WHO have significantly lower targets are undetermined. An improvement in background air quality has the potential to result in a lower impact due to the assignment of significance (see Table 3) and should any occur prior to the opening year they have the potential to reduce the slight adverse impacts in the opening year to neutral impacts.

Table 18 Predicted Annual Mean NO_2 Concentrations for Area 2: Blanchardstown

Annual Mean NO_2 Concentrations ($\mu g/m^3$)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
1	21.2	21.5	0.23	0.58%	Neutral	20.2	20.3	0.11	0.27%	Neutral
2	20.6	20.8	0.16	0.40%	Neutral	19.9	20.0	0.09	0.23%	Neutral
3	20.4	20.6	0.23	0.58%	Neutral	19.7	19.8	0.08	0.20%	Neutral
4	23.1	23.6	0.52	1.30%	Neutral	21.2	21.4	0.26	0.65%	Neutral
5	21.2	21.6	0.36	0.90%	Neutral	20.2	20.3	0.12	0.30%	Neutral
6	21.0	21.2	0.21	0.52%	Neutral	20.1	20.2	0.12	0.30%	Neutral
7	23.9	24.4	0.56	1.40%	Neutral	21.6	21.9	0.26	0.65%	Neutral
8	20.6	20.8	0.17	0.42%	Neutral	19.9	19.9	0.08	0.20%	Neutral
9	19.6	19.8	0.19	0.48%	Neutral	19.4	19.4	0.09	0.23%	Neutral
10	20.1	20.5	0.38	0.95%	Neutral	19.7	19.9	0.18	0.45%	Neutral
11	20.3	20.7	0.45	1.13%	Neutral	19.8	20.0	0.21	0.53%	Neutral
12	20.2	20.5	0.37	0.93%	Neutral	19.7	19.9	0.13	0.33%	Neutral
13	20.7	20.3	-0.35	-0.88%	Neutral	20.1	19.8	-0.30	-0.75%	Neutral
14	20.5	20.7	0.21	0.53%	Neutral	19.8	19.9	0.11	0.28%	Neutral
15	20.5	20.7	0.21	0.53%	Neutral	19.8	19.9	0.10	0.25%	Neutral
16	19.9	20.1	0.14	0.35%	Neutral	19.5	19.6	0.07	0.17%	Neutral
17	20.3	20.5	0.22	0.55%	Neutral	19.7	19.8	0.09	0.23%	Neutral
18	21.6	22.0	0.44	1.10%	Neutral	20.4	20.4	0.06	0.15%	Neutral
19	22.0	22.3	0.24	0.60%	Neutral	20.6	20.6	-0.01	-0.03%	Neutral
20	21.9	22.0	0.15	0.37%	Neutral	20.5	20.5	-0.03	-0.08%	Neutral
21	21.6	21.8	0.13	0.33%	Neutral	20.4	20.4	-0.02	-0.05%	Neutral
22	20.6	21.1	0.51	1.28%	Neutral	19.9	20.2	0.26	0.65%	Neutral
23	20.7	21.2	0.53	1.33%	Neutral	19.9	20.2	0.26	0.65%	Neutral
24	19.4	19.6	0.17	0.43%	Neutral	19.3	19.4	0.14	0.35%	Neutral

Annual Mean NO_2 Concentrations ($\mu g/m^3$)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
25	20.9	20.7	-0.14	-0.35%	Neutral	20.1	19.9	-0.13	-0.32%	Neutral
26	21.9	21.3	-0.59	-1.48%	Neutral	20.7	20.3	-0.39	-0.98%	Neutral
27	19.8	19.1	-0.71	-1.78%	Neutral	19.5	19.0	-0.43	-1.08%	Neutral
28	21.7	21.7	0.00	0.00%	Neutral	20.4	20.4	0.03	0.07%	Neutral
29	21.1	21.1	-0.02	-0.05%	Neutral	20.1	20.1	0.04	0.10%	Neutral
30	21.9	21.9	-0.07	-0.18%	Neutral	20.5	20.5	-0.03	-0.08%	Neutral
31	20.4	20.4	0.03	0.08%	Neutral	19.8	19.9	0.09	0.23%	Neutral
32	20.7	20.7	0.04	0.10%	Neutral	20.0	20.1	0.11	0.27%	Neutral
33	20.3	20.3	0.03	0.08%	Neutral	19.7	19.8	0.09	0.23%	Neutral
34	21.5	21.5	-0.02	-0.05%	Neutral	20.3	20.3	0.02	0.05%	Neutral
35	19.1	19.2	0.10	0.25%	Neutral	19.1	19.2	0.08	0.20%	Neutral
36	20.8	20.9	0.12	0.30%	Neutral	19.9	20.0	0.13	0.32%	Neutral
37	21.0	21.1	0.13	0.33%	Neutral	20.0	20.2	0.14	0.35%	Neutral
38	21.0	21.1	0.13	0.33%	Neutral	20.0	20.2	0.14	0.35%	Neutral
39	21.8	22.0	0.24	0.60%	Neutral	20.5	20.6	0.16	0.40%	Neutral
40	20.3	19.0	-1.23	-3.08%	Neutral	19.6	19.0	-0.57	-1.43%	Neutral
41	20.3	19.2	-1.05	-2.63%	Neutral	19.6	19.1	-0.48	-1.20%	Neutral
42	20.4	20.3	-0.11	-0.27%	Neutral	19.8	19.7	-0.17	-0.42%	Neutral
43	20.6	20.5	-0.12	-0.30%	Neutral	20.0	19.8	-0.20	-0.50%	Neutral
44	20.9	21.0	0.10	0.25%	Neutral	20.1	20.1	-0.03	-0.08%	Neutral
45	21.0	20.8	-0.16	-0.40%	Neutral	20.3	20.0	-0.27	-0.67%	Neutral
46	20.5	20.4	-0.11	-0.27%	Neutral	20.0	19.9	-0.13	-0.32%	Neutral
47	19.6	19.1	-0.52	-1.30%	Neutral	19.4	19.0	-0.31	-0.78%	Neutral
48	21.3	21.3	0.010	0.02%	Neutral	20.3	20.3	-0.03	-0.07%	Neutral
49	21.2	20.8	-0.38	-0.95%	Neutral	20.2	20.0	-0.15	-0.38%	Neutral
50	21.4	21.0	-0.39	-0.98%	Neutral	20.3	20.1	-0.17	-0.42%	Neutral
51	24.4	25.0	0.58	1.45%	Neutral	21.9	21.9	0.04	0.10%	Neutral
52	19.9	19.8	-0.02	-0.05%	Neutral	19.4	19.5	0.02	0.05%	Neutral

Table 19 Predicted Annual Mean PM_{10} Concentrations for Area 2: Blanchardstown

Annual Mean PM_{10} Concentrations ($\mu g/m^3$)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
1	15.5	15.7	0.23	0.58%	Neutral	15.6	15.8	0.25	0.63%	Neutral
2	14.8	15.0	0.16	0.40%	Neutral	14.9	15.1	0.20	0.50%	Neutral
3	14.5	14.7	0.25	0.63%	Neutral	14.6	14.7	0.16	0.40%	Neutral
4	17.5	18.0	0.57	1.43%	Neutral	17.6	18.1	0.56	1.40%	Neutral
5	15.4	15.8	0.40	1.00%	Neutral	15.6	15.8	0.25	0.63%	Neutral

Annual Mean PM_{10} Concentrations ($\mu g/m^3$)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
6	15.3	15.5	0.21	0.53%	Neutral	15.3	15.6	0.24	0.60%	Neutral
7	18.4	19.0	0.60	1.50%	Neutral	18.6	19.3	0.61	1.53%	Neutral
8	14.8	15.0	0.18	0.45%	Neutral	14.8	15.0	0.20	0.50%	Neutral
9	13.6	13.8	0.21	0.53%	Neutral	13.7	13.9	0.19	0.47%	Neutral
10	14.2	14.6	0.42	1.05%	Neutral	14.5	14.8	0.38	0.95%	Neutral
11	14.4	14.9	0.50	1.25%	Neutral	14.7	15.2	0.45	1.13%	Neutral
12	14.3	14.6	0.39	0.98%	Neutral	14.6	14.8	0.27	0.67%	Neutral
13	14.8	14.4	-0.40	-1.00%	Neutral	15.2	14.6	-0.62	-1.55%	Neutral
14	14.6	14.9	0.26	0.65%	Neutral	14.7	15.0	0.23	0.58%	Neutral
15	14.6	14.8	0.24	0.60%	Neutral	14.7	14.9	0.22	0.55%	Neutral
16	14.0	14.2	0.15	0.38%	Neutral	14.1	14.2	0.14	0.35%	Neutral
17	14.4	14.6	0.23	0.57%	Neutral	14.5	14.6	0.14	0.35%	Neutral
18	15.6	16.0	0.43	1.08%	Neutral	15.7	15.8	0.12	0.30%	Neutral
19	16.1	16.3	0.24	0.60%	Neutral	16.2	16.1	-0.04	-0.10%	Neutral
20	15.9	16.1	0.14	0.35%	Neutral	16.0	15.9	-0.10	-0.25%	Neutral
21	15.7	15.8	0.12	0.30%	Neutral	15.8	15.7	-0.10	-0.25%	Neutral
22	14.9	15.2	0.25	0.63%	Neutral	15.0	15.3	0.23	0.58%	Neutral
23	15.0	15.2	0.26	0.65%	Neutral	15.1	15.3	0.24	0.60%	Neutral
24	13.4	13.6	0.19	0.47%	Neutral	13.6	13.8	0.28	0.70%	Neutral
25	15.0	14.9	-0.16	-0.40%	Neutral	15.3	15.0	-0.30	-0.75%	Neutral
26	16.1	15.5	-0.66	-1.65%	Neutral	16.6	15.7	-0.83	-2.08%	Neutral
27	13.9	13.1	-0.80	-2.00%	Neutral	14.0	13.1	-0.91	-2.28%	Neutral
28	16.1	16.1	0.01	0.02%	Neutral	16.0	16.1	0.06	0.15%	Neutral
29	15.4	15.4	-0.03	-0.08%	Neutral	15.4	15.5	0.08	0.20%	Neutral
30	16.4	16.3	-0.07	-0.18%	Neutral	16.3	16.3	-0.06	-0.15%	Neutral
31	14.4	14.5	0.07	0.18%	Neutral	14.6	14.7	0.19	0.47%	Neutral
32	14.7	14.8	0.08	0.20%	Neutral	14.9	15.1	0.22	0.55%	Neutral
33	14.3	14.4	0.06	0.15%	Neutral	14.4	14.6	0.17	0.43%	Neutral
34	15.9	15.8	-0.03	-0.07%	Neutral	15.8	15.9	0.03	0.07%	Neutral
35	13.1	13.2	0.11	0.27%	Neutral	13.2	13.4	0.16	0.40%	Neutral
36	15.0	15.1	0.15	0.38%	Neutral	14.9	15.2	0.31	0.78%	Neutral
37	15.2	15.4	0.16	0.40%	Neutral	15.2	15.5	0.33	0.83%	Neutral
38	15.2	15.4	0.16	0.40%	Neutral	15.2	15.5	0.33	0.83%	Neutral
39	16.1	16.4	0.26	0.65%	Neutral	16.1	16.5	0.39	0.98%	Neutral
40	14.4	13.0	-1.33	-3.33%	Neutral	14.3	13.1	-1.20	-3.00%	Neutral
41	14.4	13.2	-1.14	-2.85%	Neutral	14.3	13.2	-1.02	-2.55%	Neutral
42	14.5	14.4	-0.10	-0.25%	Neutral	14.8	14.4	-0.38	-0.95%	Neutral
43	14.8	14.7	-0.12	-0.30%	Neutral	15.1	14.7	-0.46	-1.15%	Neutral
44	15.1	15.2	0.12	0.30%	Neutral	15.3	15.3	-0.07	-0.18%	Neutral

Annual Mean PM_{10} Concentrations ($\mu g/m^3$)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
45	15.1	14.9	-0.17	-0.43%	Neutral	15.6	15.1	-0.51	-1.28%	Neutral
46	14.7	14.6	-0.13	-0.32%	Neutral	15.2	14.9	-0.30	-0.75%	Neutral
47	13.7	13.1	-0.58	-1.45%	Neutral	13.7	13.1	-0.67	-1.68%	Neutral
48	15.5	15.5	0.01	0.03%	Neutral	15.8	15.7	-0.07	-0.18%	Neutral
49	15.3	14.9	-0.38	-0.95%	Neutral	15.4	15.1	-0.29	-0.72%	Neutral
50	15.4	15.0	-0.40	-1.00%	Neutral	15.6	15.2	-0.32	-0.80%	Neutral
51	18.6	19.1	0.57	1.43%	Neutral	18.8	18.8	0.02	0.05%	Neutral
52	14.0	14.0	-0.02	-0.05%	Neutral	14.0	14.0	0.04	0.10%	Neutral

Table 20 Predicted Annual Mean $PM_{2.5}$ Concentrations for Area 2: Blanchardstown

Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
1	9.4	9.5	0.13	0.32%	Neutral	9.4	9.6	0.14	0.35%	Neutral
2	9.0	9.1	0.10	0.25%	Neutral	9.0	9.1	0.10	0.25%	Neutral
3	8.8	9.0	0.13	0.32%	Neutral	8.9	9.0	0.09	0.23%	Neutral
4	10.5	10.8	0.31	0.77%	Neutral	10.5	10.8	0.31	0.78%	Neutral
5	9.3	9.6	0.22	0.55%	Neutral	9.4	9.5	0.14	0.35%	Neutral
6	9.3	9.4	0.13	0.33%	Neutral	9.3	9.4	0.12	0.30%	Neutral
7	11.0	11.4	0.34	0.85%	Neutral	11.1	11.4	0.34	0.85%	Neutral
8	9.0	9.1	0.09	0.23%	Neutral	9.0	9.1	0.10	0.25%	Neutral
9	8.3	8.5	0.12	0.30%	Neutral	8.4	8.5	0.10	0.25%	Neutral
10	8.7	8.9	0.23	0.58%	Neutral	8.8	9.0	0.21	0.52%	Neutral
11	8.8	9.1	0.28	0.70%	Neutral	8.9	9.2	0.25	0.63%	Neutral
12	8.7	8.9	0.21	0.53%	Neutral	8.9	9.0	0.14	0.35%	Neutral
13	9.0	8.8	-0.22	-0.55%	Neutral	9.2	8.9	-0.33	-0.83%	Neutral
14	8.9	9.0	0.14	0.35%	Neutral	9.0	9.1	0.12	0.30%	Neutral
15	8.9	9.0	0.13	0.32%	Neutral	8.9	9.1	0.12	0.30%	Neutral
16	8.6	8.7	0.09	0.23%	Neutral	8.6	8.7	0.08	0.20%	Neutral
17	8.8	8.9	0.12	0.30%	Neutral	8.8	8.9	0.08	0.20%	Neutral
18	9.4	9.7	0.25	0.63%	Neutral	9.5	9.6	0.07	0.18%	Neutral
19	9.7	9.8	0.14	0.35%	Neutral	9.7	9.7	-0.01	-0.02%	Neutral
20	9.6	9.7	0.07	0.17%	Neutral	9.7	9.6	-0.05	-0.13%	Neutral
21	9.5	9.6	0.07	0.18%	Neutral	9.5	9.5	-0.05	-0.12%	Neutral
22	9.1	9.2	0.15	0.37%	Neutral	9.1	9.2	0.13	0.33%	Neutral
23	9.1	9.2	0.15	0.38%	Neutral	9.1	9.3	0.14	0.35%	Neutral
24	8.2	8.3	0.11	0.27%	Neutral	8.3	8.5	0.16	0.40%	Neutral
25	9.1	9.0	-0.08	-0.20%	Neutral	9.2	9.1	-0.17	-0.43%	Neutral

Annual Mean $PM_{2.5}$ Concentrations (µg/m³)										
Receptor	Impact Opening Year					Impact Design Year				
	DN	DS	DS-DN	% Change of AQAL	Description	DN	DS	DS-DN	% Change of AQAL	Description
26	9.7	9.4	-0.36	-0.90%	Neutral	10.0	9.5	-0.45	-1.13%	Neutral
27	8.5	8.0	-0.45	-1.13%	Neutral	8.5	8.0	-0.49	-1.23%	Neutral
28	9.7	9.7	0.00	0.00%	Neutral	9.6	9.7	0.04	0.10%	Neutral
29	9.3	9.3	-0.01	-0.02%	Neutral	9.3	9.3	0.04	0.10%	Neutral
30	9.9	9.8	-0.04	-0.10%	Neutral	9.8	9.8	-0.03	-0.08%	Neutral
31	8.8	8.8	0.04	0.10%	Neutral	8.9	9.0	0.11	0.28%	Neutral
32	9.0	9.0	0.05	0.12%	Neutral	9.0	9.2	0.12	0.30%	Neutral
33	8.7	8.8	0.03	0.07%	Neutral	8.8	8.9	0.09	0.23%	Neutral
34	9.6	9.6	-0.02	-0.05%	Neutral	9.6	9.6	0.02	0.05%	Neutral
35	8.1	8.1	0.06	0.15%	Neutral	8.1	8.2	0.09	0.23%	Neutral
36	9.1	9.2	0.08	0.20%	Neutral	9.1	9.2	0.16	0.40%	Neutral
37	9.2	9.3	0.09	0.23%	Neutral	9.2	9.4	0.18	0.45%	Neutral
38	9.2	9.3	0.09	0.23%	Neutral	9.2	9.4	0.18	0.45%	Neutral
39	9.7	9.9	0.14	0.35%	Neutral	9.7	9.9	0.21	0.52%	Neutral
40	8.8	8.0	-0.74	-1.85%	Neutral	8.7	8.0	-0.67	-1.68%	Neutral
41	8.8	8.1	-0.63	-1.58%	Neutral	8.7	8.1	-0.57	-1.43%	Neutral
42	8.8	8.8	-0.05	-0.13%	Neutral	9.0	8.8	-0.21	-0.53%	Neutral
43	9.0	8.9	-0.07	-0.18%	Neutral	9.2	8.9	-0.25	-0.63%	Neutral
44	9.2	9.2	0.07	0.18%	Neutral	9.3	9.2	-0.04	-0.10%	Neutral
45	9.2	9.1	-0.11	-0.27%	Neutral	9.4	9.1	-0.28	-0.70%	Neutral
46	8.9	8.9	-0.07	-0.18%	Neutral	9.2	9.0	-0.16	-0.40%	Neutral
47	8.4	8.0	-0.32	-0.80%	Neutral	8.4	8.0	-0.36	-0.90%	Neutral
48	9.4	9.4	0.01	0.02%	Neutral	9.5	9.5	-0.04	-0.10%	Neutral
49	9.3	9.1	-0.21	-0.52%	Neutral	9.3	9.1	-0.16	-0.40%	Neutral
50	9.4	9.1	-0.21	-0.52%	Neutral	9.4	9.2	-0.18	-0.45%	Neutral
51	11.1	11.4	0.32	0.80%	Neutral	11.2	11.2	0.02	0.05%	Neutral
52	8.5	8.5	-0.01	-0.02%	Neutral	8.5	8.6	0.02	0.05%	Neutral

6.3.2 Operational Traffic Impacts on Ecology Receptors

6.3.2.1 Area 1: Ashtown

6.3.2.1.1 EIAR

Section 12.5.1.8.1 of the EIAR details the modelled ecology receptors and traffic data for the Ashtown area of air quality impact. The designated habitat within 200m of impacted roads in this area is the Royal Canal pNHA (Site Code: 002103). The assessment in the EIAR compared the annual mean NO_X concentration to the critical level of 30µg/m³ (including a background of 26.5µg/m³) at each of the modelled designated habitat locations (Section 12.5.1.8.1).

The Royal Canal pNHA at Ratoath Road was found to exceed the annual mean NO_X critical level of 30µg/m³ in both the DM and DS scenarios in the EIAR, however the proposed development results in a beneficial impact as the NO_x concentrations decrease at this location in the DS scenario. There are increases in NO_x

concentrations due to the proposed development at the other two modelled sensitive ecological locations (Royal Canal pNHA at Ashtown and River Road) however the NO_x concentrations remain under the critical load, and consultation with the project ecologist confirmed that the impacts are not significant.

In section 12.5.1.8.1 of the EIAR nitrogen deposition levels have been compared to the lower and higher critical loads for the designated habitat locations. All modelled locations are below the lower critical load for the designated habitat in both the DM and the DS scenarios.

The EIAR states that in accordance with the EPA Guidelines (EPA 2022) the likely ecological effects associated with the operational phase traffic emissions are overall *negative, slight and long-term*.

6.3.2.1.2 Sensitivity Analysis for New 2022 TII Guidance

The sensitivity study of NO_x, ammonia (NH_3) concentrations, nitrogen deposition levels and total acid deposition levels in the opening year 2028 (Table 21) and design year 2043 (Table 22) was conducted in line with the updated TII Guidance (TII 2022a). The traffic data, modelling scenarios and ecological receptors remained as detailed within the EIAR for the sensitivity analysis.

The sensitivity study also modelled an exceedance of the annual mean NO_x critical level at the Royal Canal pNHA (Ratoath Road) in both the DM and DS scenarios, although not as large an exceedance as the EIAR, and the proposed development continues to result in a beneficial impact as the NO_x concentrations decrease at this location. There are increases in NO_x concentrations due to the Proposed Development at the other two modelled ecological sensitive locations (Royal Canal pNHA at Ashtown and River Road) however the NO_x concentration remains under the critical load and consultation with the project ecologist confirmed that the impacts are not significant.

The 2011 TII guidance (TII 2011) methodology applied within the EIAR previously did not allow for the inclusion of NH_3 which, along with NO_2, is a component of the nutrient nitrogen deposition level. The 2022 TII guidance and REM facilitates the inclusion of NH_3. The result of this more robust modelling methodology is an increase in total nitrogen deposition levels. There are no nitrogen deposition critical loads for canals, rivers or streams, as confirmed with the project ecologist. PE-ENV-01107 (TII 2022b) also specifically states in Section 3.5.2 that it is not necessary to include sites that have been designated as a geological feature or a water course. However, the conservative critical load of 5 kgN/ha/yr for nitrogen deposition has been retained as per the EIAR. 5 kgN/ha/yr is considered the critical load for the most sensitive habitat to nitrogen deposition, according to Air Pollution Information System (APIS) (as recommended as a critical load source by PE-ENV-01107 (TII 2022b)) and agreed with the project ecologist that it is an absolute worst-case scenario. Critical loads are set due to the impact of nitrogen deposition causing changes in species composition and sensitivity of vegetation to environmental stresses, such as drought, frost or insect predation.

The sensitivity study indicates an exceedance of the critical load for nitrogen deposition at the Royal Canal pNHA at Ratoath Road, however the nitrogen deposition level decreases in the DS relative to the DM and therefore the impact of the proposed project is beneficial at this location, this is consistent with the EAIR impact. No new exceedances of the critical load were modelled in the sensitivity study above and beyond those reported in the EIAR, for the operational phase of the proposed project in proximity to Ashtown.

In some discreet locations there will be a slight reduction in air quality, although there are improvements at other locations. However, where air quality is negatively affected, critical loads are not exceeded as a result of the proposed development. With regards to modelled exceedances, these should be viewed with some caution due to a conservative background value for NO_x and NO_2 being utilised. In addition, it should be noted that the impacts modelled only account for road vehicles. The reduction in diesel related rail emissions have not been included within these calculations, which would in reality reduce ambient pollutant concentrations.

In summary, the operational phase road traffic impacts on sensitive ecology, in accordance with the new TII Guidance (2022a), in EIA terms are overall not significant. This is in keeping with the Section 12.5.1.8.1 of the EIAR.

Table 21 Ashtown: 2028 Predicted Nitrogen and Acid Deposition Results at Closest Point within Royal Canal pNHA to Road

2028						
Scenario	Predicted Ground Level NO_x Concentration (excluding background Note 1) µg/m³	Predicted Ground Level NH_3 Concentration (excluding background Note 2) µg/m³	Predicted Ground Level NO_x Concentration (including background Note 1) µg/m³	Predicted Ground Level NH_3 Concentration (including background Note 2) µg/m³	Nutrient Nitrogen Deposition (kg/ha/year)	Total Acid Deposition (keq/ha/yr)
Royal Canal pNHA- Ashtown						
Maximum predicted ground level concentration						
Do- Minimum	1.5	0.25	28	1.25	1.41	0.1
Do- Something	2.8	0.47	29.3	1.47	2.65	0.19
Difference between Do-Something and Do-Minimum			1.3	0.22	1.24	0.09
Change relative to lower critical load (%)			4.3%	22.0%	25%	0.04%
Royal Canal pNHA - Ratoath Road						
Maximum predicted ground level concentration						
Do- Minimum	7.22	1.16	33.72	2.16	6.55	0.47
Do- Something	6.98	1.07	33.48	2.07	6.07	0.43
Difference between Do-Something and Do-Minimum			-0.24	-0.09	-0.48	-0.04
Change relative to lower critical load (%)			-0.8%	-9.0%	-10%	-0.02%
Royal Canal pNHA - Proximity to River Road						
Maximum predicted ground level concentration						
Do- Minimum	1.12	0.21	27.62	1.21	1.17	0.08
Do- Something	1.000	0.19	27.500	1.19	1.06	0.08
Difference between Do-Something and Do-Minimum			-0.12	-0.02	-0.11	0.0000
Change relative to lower critical load (%)			-0.4%	-2.0%	-2%	0.00%

Note 1 A NO_x background concentration of 26.5 µg/m³ added to modelled road contribution.

Note2 A NH_3 background concentration of 1 µg/m³ added to modelled road contribution.

Table 22 Ashtown: 2043 Predicted Nitrogen and Acid Deposition Results at Closest Point within Royal Canal pNHA to Road

2043						
Scenario	Predicted Ground Level NO_x Concentration (excluding background Note 1) µg/m³	Predicted Ground Level NH_3 Concentration (excluding background Note 2) µg/m³	Predicted Ground Level NO_x Concentration (including background Note 1) µg/m³	Predicted Ground Level NH_3 Concentration (including background Note 2) µg/m³	Nutrient Nitrogen Deposition (kg/ha/year)	Total Acid Deposition (keq/ha/yr)
Royal Canal pNHA- Ashtown						
Maximum predicted ground level concentration						
Do- Minimum	0.84	0.29	27.34	1.29	1.57	0.11
Do- Something	1.48	0.51	27.98	1.51	2.76	0.2
Difference between Do-Something and Do-Minimum			0.64	0.22	1.19	0.09

2043						
Scenario	Predicted Ground Level NO_x Concentration (excluding background	Predicted Ground Level NH_3 Concentration (excluding background	Predicted Ground Level NO_x Concentration (including background	Predicted Ground Level NH_3 Concentration (including background	Nutrient Nitrogen Deposition (kg/ha/year)	Total Acid Deposition (keq/ha/yr)
	Note 1) µg/m³	Note 2) µg/m³	Note 1) µg/m³	Note 2) µg/m³		
Change relative to lower critical load (%)			2.1%	22.0%	24%	0.04%
Royal Canal pNHA - Ratoath Road						
Maximum predicted ground level concentration						
Do- Minimum	3.73	1.26	30.23	2.26	6.82	0.49
Do-Something	3.56	1.13	30.06	2.13	6.14	0.44
Difference between Do-Something and Do-Minimum			-0.17	-0.13	-0.68	-0.05
Change relative to lower critical load (%)			-0.6%	-13.0%	-14%	-0.02%
Royal Canal pNHA - Proximity to River Road						
Maximum predicted ground level concentration						
Do- Minimum	0.58	0.22	27.08	1.22	1.18	0.08
Do-Something	0.51	0.19	27.01	1.19	1.03	0.07
Difference between Do-Something and Do-Minimum			-0.07	-0.03	-0.15	-0.0100
Change relative to lower critical load (%)			-0.2%	-3.0%	-3%	0.00%

Note 1 A NO_x background concentration of 26.5 µg/m³ added to modelled road contribution.

Note2 A NH_3 background concentration of 1 µg/m³ added to modelled road contribution.

6.3.2.2 Area 2: Coolmine/Clonsilla

6.3.2.2.1 EIAR

Section 12.5.1.8.2 of the EIAR details the modelled ecology receptors and traffic data for the Coolmine/Clonsilla area of air quality impact. The designated ecology within 200m of impacted roads in this area is the Royal Canal pNHA (Site Code: 002103). The assessment in the EIAR compared the annual mean NO_X concentration to the critical level of 30µg/m³ (including a background of 26.5µg/m³) at each of the modelled designated habitat locations (Section 12.5.1.8.1).

The Royal Canal pNHA at Diswellstown Road, Clonsilla and Castleknock was found to exceed the critical value of 30µg/m³ in both the DM and DS scenarios in the EIAR, however the proposed development results in a beneficial impact as the NO_x concentrations decrease at these locations in the DS scenario. A maximum 9.9% decrease in NO_x concentrations has been modelled at the Coolmine Road intersection with the pNHA in 2028 and 9% decrease in 2043 due to the Coolmine Road closure.

In section 12.5.1.8.2 of the EIAR nitrogen deposition levels have been compared to the lower and higher critical loads for the designated habitat locations. All modelled locations are below the lower critical load for the designated habitat in both the DM and the DS scenarios.

The EIAR states that in accordance with the EPA Guidelines (EPA 2022) the likely ecological effects associated with the operational phase traffic emissions are overall *negative, slight and long-term*.

6.3.2.2.2 Sensitivity Analysis

The sensitivity study of NO_x, ammonia (NH_3) concentrations, nitrogen deposition levels and total acid deposition levels in the opening year 2028 (Table 23) and design year 2043 (Table 24) was conducted in line with the updated TII Guidance (TII 2022a). As with the human receptors, the traffic data, modelling scenarios and receptors remained as detailed within the EIAR.

The Royal Canal pNHA at Clonsilla was found to no longer exceed the annual mean NO_x critical level of 30µg/m^3 within the sensitivity study using the TII REM (TII 2022c). This is consistent with the EIAR findings. NO_x concentrations remain above the annual mean NO_x critical level of 30µg/m^3 at Diswellstown Road and Castleknock in both the DM and DS scenarios, however the proposed development continues to result in a beneficial impact as the NO_x concentrations decrease at this location. A maximum decrease of 8% in NO_x concentrations has been modelled in 2028 and 4% decrease in 2043 due of the Coolmine Road closure. While greater benefits were modelled within the EIAR, the overall concentration is lower and no longer exceeding the critical level. This change is likely as a result of the conservative nature of the DMRB methodology used in the EIAR with respect to emissions from the vehicle fleet. No new exceedances of the NO_x critical load were modelled at the other Royal Canal pNHA locations in the sensitivity study, above and beyond those reported in the EIAR. In addition to no longer showing an exceedance at Clonsilla, the level of exceedance modelled in the sensitivity study were lower than those in the EIAR.

The 2011 TII guidance (TII 2011) methodology applied within the EIAR previously did not allow for the inclusion of NH_3 which, along with NO_2, is a component of the nutrient nitrogen deposition level. The 2022 TII guidance and REM facilitates the inclusion of NH_3. The result of this more robust modelling methodology is an increase in total nitrogen deposition levels. There are no nitrogen deposition critical loads for canals, rivers or streams, as confirmed with the project ecologist. PE-ENV-01107 (TII 2022b) also specifically states in Section 3.5.2 that it is not necessary to include sites that have been designated as a geological feature or a water course. However, the conservative critical load of 5 kgN/ha/yr for nitrogen deposition has been retained as per the EIAR. 5 kgN/ha/yr is considered the critical load for the most sensitive habitat to nitrogen deposition, according to Air Pollution Information System (APIS) (as recommended as a critical load source by PE-ENV-01107 (TII 2022b)) and agreed with the project ecologist that it is an absolute worst-case scenario. Critical loads are set due to the impact of nitrogen deposition causing changes in species composition and sensitivity of vegetation to environmental stresses, such as drought, frost or insect predation. The sensitivity study indicates an exceedance of the critical load for nitrogen deposition at the Royal Canal pNHA at Diswellstown Road and Castleknock in both the DM and DS scenarios. These exceedances have been highlighted to the project ecologist.

In some discreet locations there will be a slight reduction in air quality, although there are improvements at other locations. However, where air quality is negatively affected, critical loads are not exceeded as a result of the proposed development. With regards to modelled exceedances, these should be viewed with some caution due to a conservative background value for NO_x and NO_2 being utilised. In addition, it should be noted that the impacts modelled only account for road vehicles. The reduction in diesel related rail emissions have not been included within these calculations, which would in reality reduce ambient pollutant concentrations.

In summary, the operational phase road traffic impacts on sensitive ecology, in accordance with the new TII Guidance (2022a), in EIA terms are overall not significant. This is in keeping with the Section 12.5.1.8.2 of the EIAR.

Table 23 Coolmine/Clonsilla: Predicted Nitrogen and Acid Deposition Results at Closest Point within Ecological Sites to Road 2028

2028						
Scenario	Predicted Ground Level NO_x Concentration (excluding background	Predicted Ground Level NH_3 Concentration (excluding background	Predicted Ground Level NO_x Concentration (including background	Predicted Ground Level NH_3 Concentration (including background	Nutrient Nitrogen Deposition (kg/ha/year)	Total Acid Deposition (keq/ha/yr)
	Note 1) µg/m³	Note 2) µg/m³	Note 1) µg/m³	Note 2) µg/m³		
Royal Canal pNHA - Coolmine Road						
Maximum predicted ground level concentration						
Do- Minimum	2.44	0.42	28.94	1.42	2.36	0.17
Do- Something	0.00 (Road closed)	0.00	26.50	1.00	0.00	0.00
Difference between Do-Something and Do-Minimum			-2.44	-0.42	-2.36	-0.17
Change relative to lower critical load (%)			-8.1%	-42.0%	-47%	-0.07%
Royal Canal pNHA - Diswellstown Road						
Maximum predicted ground level concentration						
Do- Minimum	7.36	1.54	33.86	2.54	8.54	0.61
Do- Something	8.11	1.96	34.61	2.96	10.78	0.77
Difference between Do-Something and Do-Minimum			0.75	0.42	2.24	0.16
Change relative to lower critical load (%)			2.5%	42.0%	45%	0.06%
Royal Canal pNHA - Clonsilla						
Maximum predicted ground level concentration						
Do- Minimum	1.58	0.28	28.08	1.28	1.58	0.11
Do- Something	0.00 (Road closed)	0.00	26.50	1.00	0.00	0.00
Difference between Do-Something and Do-Minimum			-1.58	-0.28	-1.58	-0.1100
Change relative to lower critical load (%)			-5.3%	-28.0%	-32%	-0.04%
Royal Canal pNHA - Barberstown						
Maximum predicted ground level concentration						
Do- Minimum	0.59	0.10	27.09	1.10	0.56	0.04
Do- Something	0.91	0.16	27.41	1.16	0.90	0.06
Difference between Do-Something and Do-Minimum			0.32	0.06	0.34	0.02
Change relative to lower critical load (%)			1.1%	6.0%	7%	0.01%
Royal Canal pNHA - Castleknock Road						
Maximum predicted ground level concentration						
Do- Minimum	7.58	1.31	34.08	2.31	7.36	0.53
Do- Something	7.97	1.49	34.47	2.49	8.33	0.60
Difference between Do-Something and Do-Minimum			0.39	0.18	0.97	0.0700

Note 1 A NO_x background concentration of 26.5 µg/m³ added to modelled road contribution.

Note2 A NH_3 background concentration of 1 µg/m³ added to modelled road contribution.

Table 24 Coolmine/Clonsilla: Predicted Nitrogen and Acid Deposition Results at Closest Point within Ecological Sites to Road 2043

2043						
Scenario	Predicted Ground Level NO_x Concentration (excluding background Note 1) µg/m³	Predicted Ground Level NH_3 Concentration (excluding background Note 2) µg/m³	Predicted Ground Level NO_x Concentration (including background Note 1) µg/m³	Predicted Ground Level NH_3 Concentration (including background Note 2) µg/m³	Nutrient Nitrogen Deposition (kg/ha/year)	Total Acid Deposition (keq/ha/yr)
Royal Canal pNHA - Coolmine Road						
Maximum predicted ground level concentration						
Do- Minimum	1.14	0.40	27.64	1.40	2.16	0.15
Do- Something	0.00	0.00	26.50	1.00	0.00	0.00
Difference between Do-Something and Do-Minimum			-1.14	-0.4	-2.16	-0.15
Change relative to lower critical load (%)			-3.8%	-40.0%	-43%	-0.06%
Royal Canal pNHA - Diswellstown Road						
Maximum predicted ground level concentration						
Do- Minimum	3.92	1.77	30.42	2.77	9.48	0.68
Do- Something	4.30	2.24	30.80	3.24	11.96	0.85
Difference between Do-Something and Do-Minimum			0.38	0.47	2.48	0.17
Change relative to lower critical load (%)			1.3%	47.0%	50%	0.07%
Royal Canal pNHA - Clonsilla						
Maximum predicted ground level concentration						
Do- Minimum	0.95	0.33	27.45	1.33	1.79	0.13
Do- Something	0.00	0.00	26.50	1.00	0.00	0.00
Difference between Do-Something and Do-Minimum			-0.95	-0.33	-1.79	-0.1300
Change relative to lower critical load (%)			-3.2%	-33.0%	-36%	-0.05%
Royal Canal pNHA - Barberstown						
Maximum predicted ground level concentration						
Do- Minimum	0.40	0.14	26.90	1.14	0.76	0.05
Do- Something	0.68	0.23	27.18	1.23	1.25	0.09
Difference between Do-Something and Do-Minimum			0.28	0.09	0.49	0.04
Change relative to lower critical load (%)			0.9%	9.0%	10%	0.02%
Royal Canal pNHA - Castleknock Road						
Maximum predicted ground level concentration						
Do- Minimum	4.00	1.42	30.50	2.42	7.67	0.55
Do- Something	3.92	1.38	30.42	2.38	7.47	0.53
Difference between Do-Something and Do-Minimum			-0.08	-0.04	-0.2	-0.0200
Change relative to lower critical load (%)			-0.3%	-4.0%	-4%	-0.01%

Note 1 A NO_x background concentration of 26.5 µg/m³ added to modelled road contribution.

Note2 A NH_3 background concentration of 1 µg/m³ added to modelled road contribution.

6.4 Summary

In summary, the operational phase road traffic impacts on sensitive human and ecology receptors, in accordance with the new TII Guidance (2022a), are overall *not significant* in EIA terms. This is consistent with the impacts reported in Section 12.5.2 of the EIAR.

7. REFERENCES

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