

Appendix 12.1

Air Quality Legislation and Guidance

12.1 Air Quality Legislation and Guidance

Legislative Framework

Air Quality Strategy

The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS). The AQS provides a framework for reducing air pollution in the UK with the aim of meeting the requirements of European Union legislation.

The AQS also sets standards and objectives for a range of key air pollutants to protect health, vegetation and ecosystems. These include benzene (C₆H₆), 1,3 butadiene (C₄H₆), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), particulate matter (PM₁₀ and PM_{2.5}), sulphur dioxide (SO₂), ozone (O₃), and polycyclic aromatic hydrocarbons (PAHs).

The air quality standards are pollutant concentrations measured over a given period of time that are considered acceptable based on scientific knowledge about the effects of each pollutant on health and the environment.

The air quality objectives are policy-based targets for achieving the standards set by the Government, which take into account economic efficiency, practicability, technical feasibility and timescale. As such, some objectives involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given time period.

The AQS contains a framework for considering the effects of a finer group of particles known as 'PM_{2.5}' as there is increasing evidence that this size of particles can be more closely associated with observed adverse health effects than PM₁₀. Local Authorities are required to work towards reducing emissions/concentrations of particulate matter within their administrative area.

Air Quality Regulations

Many of the objectives in the AQS have been made statutory in England with the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002 for the purpose of Local Air Quality Management (LAQM).

These Regulations require that likely exceedances of the AQS objectives are assessed in relation to:

"...the quality of air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present..."

The Air Quality Standards Regulations 2010 transpose the European Union Ambient Air Quality Directive (2008/50/EC) into law in England. This Directive sets legally binding limit values for concentrations in outdoor air of major air pollutants that impact public health such as PM₁₀, PM_{2.5} and NO₂. The limit values for NO₂ and PM₁₀ are the same concentration levels as the relevant AQS objectives and the limit value for PM_{2.5} is a concentration of 25µg/m³. However, Regulation 2 of the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 updates the Air Quality Standards Regulations 2010 to include a limit value for PM_{2.5} of 20µg/m³ from 2020. At the time that the Air Quality Standards Regulations 2010 were made the limit value for this pollutant was under review by the European Commission.

For many parts of the UK, the primary pollutants of concern are those relating to road traffic emissions and, to a lesser extent, heating and commercial sources. The key pollutants of concern are, therefore, typically NO₂, PM₁₀ and PM_{2.5}.

A summary of the standards and objectives relevant to these pollutants is provided in Table 12.1 within the main chapter. For NO₂ and PM₁₀, there are both long-term (annual mean) and short-term (24-hour or 1 hour mean) standards. These periods reflect the varying impacts on health of differing levels of exposure to these pollutants.

Environment Act 1995

Under Part IV of the Environment Act 1995, local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives defined in the Regulations. Where the objectives are not likely to be achieved, an authority is required to designate an Air Quality Management Area (AQMA). For each AQMA the local authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality and show how it intends to work towards achieving the air quality objectives in the future.

Environment Act 2021

The Environment Act 2021, published in November 2021, provides a new framework for environmental protection within the UK. It aims to ensure that environmental standards are maintained and that improvements are achieved (specifically in relation to air quality, water, waste and resources, nature and biodiversity) and bridges the gaps in legislation resulting from the UK's departure from the EU. The Environment Act 2021 does not replace the Environment Act 1995, but it does make amendments in order to strengthen environmental protections. In relation to air quality, the Environment Act 2021 includes a legally binding duty on Government to bring forward at least two new air quality targets for PM_{2.5} into secondary legislation by 31st October 2022.

Environmental Improvement Plan 2023

The Environmental Improvement Plan 2023 sets out new legally binding, long-term targets that both reduce concentrations of, and drive down people's exposure to, PM_{2.5}. The interim and long-term targets are:

By the end of January 2028:

- The highest annual mean concentration in the most recent full calendar year must not exceed 12 µg/m³ of PM_{2.5}.
- Compared to 2018, the reduction in population exposure to PM_{2.5} in the most recent full calendar year must be 22% or greater.

By the end of 2040:

- By the end of 2040, we will achieve a maximum Annual Mean Concentration Target (AMCT) of 10 micrograms of PM_{2.5} or below per cubic metre (µg/m³).
- By the end of 2040, we will reduce population exposure to PM_{2.5} by 35% compared to 2018 levels.

Clean Air Strategy

Defra published the Government's Clean Air Strategy in 2019. This sets out measures, which aim to reduce emissions from all sources of air pollution, making air healthier to breathe, protecting nature and boosting the economy. The Strategy also proposes tough new goals to cut public exposure to airborne particulate matter, as per the recommendations made by the WHO.

Furthermore, the Strategy confirms that the Government will set new legislation to 'create a stronger and a more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem. These will support the creation of Clean Air Zones to lower emissions from all sources of air pollution, backed up with clear enforcement mechanism.' New enforcement powers will also be given at a national and local level, across all sectors of society.

Environmental Protection Act – Control of Dust and Particulates associated with Construction

Section 79 of the Environmental Protection Act 1990 gives the following definitions of statutory nuisance relevant to dust and particles:

"Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance"; and

"Any accumulation or deposit which is prejudicial to health or a nuisance".

Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist. Nuisance is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred.

Guidance

In addition to the above framework, the following guidance documents are relevant to the assessment:

- **Local Air Quality Management Review and Assessment Technical Guidance** - published by the Department for Environment, Food and Rural Affairs (Defra) for use by local authorities in their review and assessment work.
- **Land-Use Planning & Development Control: Planning for Air Quality** - Guidance published by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) offering comprehensive advice on: when an air quality assessment may be required; what should be included in an assessment; how to determine the significance of any air quality impacts associated with a development; and, the possible mitigation measures that may be implemented to minimise these impacts.
- **Guidance on the Assessment of Dust from Demolition and Construction** – Guidance published by the IAQM provides guidance to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM₁₀ impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measures appropriate to the level of risk identified.
- **National Planning Practice Guidance – Air Quality** - This guidance provides a number of guiding principles on how the planning process can take into account the impact of new development on air quality and explains how much detail air quality assessments need to include for proposed developments, and how impacts on air quality can be mitigated.
- **Air Quality and Planning Technical Guidance** - MCC has published their own Air Quality and Planning Technical Guidance which aims to provide help and advice in relation to air quality in a planning context to encourage good practice and mitigation of impacts. The approach set out within this document is in part based on the abovementioned guidance produced by EPUK and the IAQM.

Appendix 12.2

IAQM Construction Dust Assessment
Methodology

12.2 IAQM Construction Dust Assessment

Methodology

Step 1 – Screening the need for a Detailed Assessment

An assessment will normally be required where there are:

- 'Human receptors' within 350m of the site boundary; or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or
- 'Ecological receptors' within 50m of the site boundary; or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is "negligible".

Step 2A – Define the Potential Dust Emission Magnitude

The following are examples of how the potential dust emission magnitude for different activities can be defined. (Note that not all the criteria need to be met for a particular class). Other criteria may be used if justified in the assessment.

Table 2A: Definitions of Dust Emission Magnitudes

Dust Emission Magnitude	Activity
Large	Demolition >50,000m ³ building demolished, dusty material (e.g. concrete), on-site crushing/screening, demolition >20m above ground level
	Earthworks >10,000m ² site area, dusty soil type (e.g. clay), >10 earth moving vehicles active simultaneously, >8m high bunds formed, >100,000 tonnes material moved
	Construction >100,000m ³ building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty surface material (e.g. clay), >100m unpaved roads

Medium	Demolition 20,000 - 50,000m ³ building demolished, dusty material (e.g. concrete) 10-20m above ground level
	Earthworks 2,500 - 10,000m ² site area, moderately dusty soil (e.g. silt), 5-10 earth moving vehicles active simultaneously, 4m - 8m high bunds, 20,000 -100,000 tonnes material moved
	Construction 25,000 - 100,000m ³ building volume, dusty material e.g. concrete, on site concrete batching
	Trackout 10 - 50 HDVs out / day, moderately dusty surface material (e.g. clay), 50 -100m unpaved roads
Small	Demolition <20,000m ³ building demolished, non-dusty material (e.g metal cladding), <10m above ground level, work during wetter months
	Earthworks <2,500m ² site area, soil with large grain size (e.g. sand), <5 earth moving vehicles active simultaneously, <4m high bunds, <20,000 tonnes material moved, earthworks during wetter months
	Construction <25,000m ³ , non-dusty material (e.g. metal cladding or timber)
	Trackout <10 HDVs out / day, non-dusty soil, < 50m unpaved roads

Step 2B – Define the Sensitivity of the Area

The tables below present the IAQM assessment methodology to determine the sensitivity of the area to dust soiling, human health and ecological impacts respectively. The IAQM guidance provides guidance to allow the sensitivity of individual receptors to dust soiling and health effects to assist in the assessment of the overall sensitivity of the study area.

Table 2Ba: Sensitivity of the Area to Dust Soiling Effects

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 2Bb: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM ₁₀ Concentration (µg/m ³)	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low

Low	-	>1	Low	Low	Low	Low	Low
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Table 2Bc: Sensitivity of the Area to Ecological Impacts

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

Step 2C – Define the Risk of Impacts

The dust emissions magnitude determined at Step 2A should be combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts without mitigation applied. For those cases where the risk category is ‘negligible’ no mitigation measures beyond those required by legislation will be required.

Table 2C: Risk of Dust Impacts

Sensitivity of surrounding area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks and Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Step 3 – Site Specific Mitigation

Having determined the risk categories for each of the four activities it is possible to determine the site-specific measures to be adopted. These measures will be related to whether the site is considered to be a low, medium or high-risk site. The IAQM guidance details the mitigation measures required for high, medium and low risk sites as determined in Step 2C.

Step 4 – Determine Significant Effects

Once the risk of dust impacts has been determined in Step 2C and the appropriate dust mitigation measures identified in Step 3, the final step is to determine whether there are significant effects arising from the construction phase. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.

Appendix 12.3

Traffic Data Used in the Assessment

12.3 Traffic Data used in the Assessment

Traffic data for use in the assessment was provided by WSP, the project Transport Consultants. A summary of this data, and the calculated emission factors, is provided in the tables overleaf. For the purposes of the modelling, all modelled road links were assigned a unique Link ID number. The locations of the links are illustrated on Figure A12.3.1.



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Link ID	Speed (kph)	2019 Base					2029 Without Dev					2032 Without Dev				
		AADT	% HGV	NO _x (g/km/s)	PM ₁₀ (g/km/s)	PM _{2.5} (g/km/s)	AADT	% HGV	NO _x (g/km/s)	PM ₁₀ (g/km/s)	PM _{2.5} (g/km/s)	AADT	% HGV	NO _x (g/km/s)	PM ₁₀ (g/km/s)	PM _{2.5} (g/km/s)
A_B_1	10	14084	6.51	0.1364	0.0072	0.0045	15715	6.42	0.0514	0.0071	0.0040	16123	6.42	0.0473	0.0072	0.0041
B_B_1	40	3714	0.65	0.0141	0.0015	0.0008	4181	0.62	0.0058	0.0015	0.0009	4289	0.63	0.0051	0.0016	0.0009
AC_B_1	40	6445	1.25	0.0252	0.0026	0.0015	7648	1.35	0.0108	0.0029	0.0016	7839	1.31	0.0096	0.0029	0.0016
AC_B_2	40	6445	1.25	0.0252	0.0026	0.0015	7648	1.35	0.0108	0.0029	0.0016	7839	1.31	0.0096	0.0029	0.0016
AC_B_3	40	6445	1.25	0.0252	0.0026	0.0015	7648	1.35	0.0108	0.0029	0.0016	7839	1.31	0.0096	0.0029	0.0016
AC_B_4	40	6445	1.25	0.0252	0.0026	0.0015	7648	1.35	0.0108	0.0029	0.0016	7839	1.31	0.0096	0.0029	0.0016
C_W_1	40	17983	3.38	0.0765	0.0076	0.0044	20313	3.29	0.0299	0.0080	0.0044	20834	3.3	0.0267	0.0082	0.0045
C_E_2	10	13281	3.37	0.1038	0.0062	0.0038	14655	3.36	0.0399	0.0061	0.0035	15041	3.36	0.0362	0.0062	0.0035
C_B_3	40	31264	3.37	0.1329	0.0133	0.0077	34968	3.32	0.0515	0.0139	0.0077	35875	3.32	0.0460	0.0142	0.0078
C_W_4	40	17983	3.38	0.0765	0.0076	0.0044	20313	3.29	0.0299	0.0080	0.0044	20834	3.3	0.0267	0.0082	0.0045
C_E_5	40	13281	3.37	0.0565	0.0056	0.0033	14655	3.36	0.0216	0.0058	0.0032	15041	3.36	0.0193	0.0060	0.0033
E_B_1	10	18198	2.76	0.1357	0.0083	0.0051	20835	2.65	0.0542	0.0085	0.0048	21363	2.66	0.0488	0.0086	0.0049
F_W_1	10	18731	2.56	0.1374	0.0085	0.0052	22170	2.38	0.0566	0.0089	0.0051	22714	2.39	0.0508	0.0091	0.0052
F_E_2	10	13236	2.79	0.0989	0.0060	0.0037	16077	2.53	0.0414	0.0065	0.0037	16461	2.53	0.0372	0.0066	0.0038
G_W_1	10	14848	2.45	0.1079	0.0067	0.0041	17840	2.24	0.0451	0.0072	0.0041	18271	2.25	0.0404	0.0073	0.0041
G_E_2	10	14510	2.34	0.1045	0.0065	0.0040	17545	2.13	0.0440	0.0070	0.0040	17966	2.13	0.0394	0.0071	0.0041
H_W_1	10	15712	2.62	0.1158	0.0071	0.0044	18783	2.41	0.0480	0.0076	0.0043	19239	2.42	0.0432	0.0077	0.0044
H_E_2	40	14629	2.73	0.0607	0.0061	0.0035	17485	2.51	0.0253	0.0068	0.0038	17910	2.52	0.0225	0.0069	0.0038
I_S_1	10	7528	2.34	0.0542	0.0034	0.0021	8392	2.31	0.0213	0.0034	0.0019	8611	2.31	0.0192	0.0034	0.0020
I_N_2	10	7312	2.63	0.0539	0.0033	0.0020	8096	2.61	0.0210	0.0033	0.0019	8308	2.61	0.0189	0.0033	0.0019
I_B_3	10	14840	2.48	0.1082	0.0067	0.0041	16488	2.46	0.0423	0.0067	0.0038	16918	2.46	0.0381	0.0068	0.0039
J_S_1	40	9302	2.89	0.0388	0.0039	0.0023	10344	2.86	0.0151	0.0041	0.0022	10614	2.86	0.0135	0.0041	0.0023
J_N_2	40	8047	3.14	0.0339	0.0034	0.0020	8904	3.12	0.0131	0.0035	0.0019	9138	3.13	0.0117	0.0036	0.0020
J_B_3	40	17349	3.01	0.0727	0.0073	0.0042	19248	2.98	0.0281	0.0076	0.0042	19752	2.98	0.0251	0.0077	0.0043
J_N_4	10	8047	3.14	0.0618	0.0037	0.0023	8904	3.12	0.0239	0.0037	0.0021	9138	3.13	0.0216	0.0037	0.0021
J_S_5	10	9302	2.89	0.0701	0.0042	0.0026	10344	2.86	0.0273	0.0042	0.0024	10614	2.86	0.0246	0.0043	0.0024
J_B_6	10	17349	3.01	0.1319	0.0080	0.0049	19248	2.98	0.0512	0.0079	0.0045	19752	2.98	0.0462	0.0080	0.0046
J_B_7	40	17349	3.01	0.0727	0.0073	0.0042	19248	2.98	0.0281	0.0076	0.0042	19752	2.98	0.0251	0.0077	0.0043
K_S_1	10	12254	3.48	0.0966	0.0057	0.0035	15250	3.08	0.0408	0.0063	0.0036	15606	3.09	0.0368	0.0064	0.0036
K_B_2	40	29478	3.35	0.1252	0.0125	0.0073	35873	3.03	0.0525	0.0141	0.0078	36728	3.03	0.0467	0.0144	0.0079
K_N_3	10	17224	3.25	0.1334	0.0080	0.0049	20623	2.99	0.0549	0.0084	0.0048	21122	2.99	0.0495	0.0086	0.0049
K_S_4	10	12254	3.48	0.0966	0.0057	0.0035	15250	3.08	0.0408	0.0063	0.0036	15606	3.09	0.0368	0.0064	0.0036
K_N_5	10	17224	3.25	0.1334	0.0080	0.0049	20623	2.99	0.0549	0.0084	0.0048	21122	2.99	0.0495	0.0086	0.0049



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L_B_1	10	3636	9.41	0.0415	0.0020	0.0013	6165	6.1	0.0198	0.0027	0.0016	6271	6.16	0.0181	0.0028	0.0016
M_W_1	10	15823	2.17	0.1124	0.0070	0.0043	18685	2.02	0.0465	0.0074	0.0043	19144	2.02	0.0416	0.0076	0.0043
M_W_2	10	15823	2.17	0.1124	0.0070	0.0043	18685	2.02	0.0465	0.0074	0.0043	19144	2.02	0.0416	0.0076	0.0043
M_W_3	10	15823	2.17	0.1124	0.0070	0.0043	18685	2.02	0.0465	0.0074	0.0043	19144	2.02	0.0416	0.0076	0.0043
N_N_1	10	5309	11.62	0.0676	0.0031	0.0020	6039	11.24	0.0249	0.0030	0.0017	6193	11.25	0.0234	0.0031	0.0018
AH_S_1	10	8999	6.77	0.0885	0.0047	0.0029	10012	6.74	0.0333	0.0045	0.0026	10276	6.78	0.0308	0.0046	0.0026
N_N_2	10	5309	11.62	0.0676	0.0031	0.0020	6039	11.24	0.0249	0.0030	0.0017	6193	11.25	0.0234	0.0031	0.0018
AF_N_1	10	7758	9.93	0.0909	0.0044	0.0028	8771	9.79	0.0339	0.0043	0.0024	8999	9.7	0.0315	0.0044	0.0025
N_S_3	10	5300	11.77	0.0679	0.0032	0.0020	6110	11.23	0.0252	0.0031	0.0018	6264	11.25	0.0236	0.0031	0.0018
O_B_1	10	8785	13.53	0.1218	0.0055	0.0035	9775	13.38	0.0441	0.0052	0.0029	10030	13.39	0.0416	0.0053	0.0030
W_B_1	40	8771	1.92	0.0352	0.0036	0.0021	9872	2.09	0.0142	0.0038	0.0021	10122	2.04	0.0126	0.0039	0.0021
P_B_1	40	5097	1.24	0.0199	0.0020	0.0012	5806	1.19	0.0082	0.0022	0.0012	5954	1.19	0.0072	0.0022	0.0012
Q_B_1	40	14565	2.13	0.0590	0.0060	0.0035	16024	2.13	0.0230	0.0062	0.0034	16446	2.13	0.0205	0.0063	0.0035
R_B_1	40	19255	2.79	0.0800	0.0080	0.0047	21184	2.79	0.0309	0.0083	0.0046	21742	2.79	0.0275	0.0085	0.0047
S_B_1	40	14939	3.75	0.0644	0.0064	0.0037	17448	3.53	0.0258	0.0070	0.0038	17882	3.53	0.0230	0.0071	0.0039
T_E_1	10	9562	6.35	0.0917	0.0049	0.0030	11694	5.71	0.0368	0.0052	0.0029	11972	5.72	0.0337	0.0053	0.0030
T_W_2	10	10015	5.48	0.0909	0.0050	0.0031	11671	5.18	0.0356	0.0051	0.0029	11962	5.18	0.0326	0.0052	0.0029
X_B_1	40	2327	0.63	0.0089	0.0009	0.0005	2576	0.85	0.0036	0.0010	0.0005	2642	0.83	0.0032	0.0010	0.0005
Y_B_1	40	6709	2.19	0.0272	0.0027	0.0016	7399	2.38	0.0107	0.0029	0.0016	7597	2.32	0.0095	0.0029	0.0016
Z_N_1	10	12361	3.33	0.0963	0.0057	0.0035	13961	3.31	0.0379	0.0058	0.0033	14313	3.28	0.0342	0.0059	0.0033
Z_B_2	40	27004	2.77	0.1122	0.0113	0.0066	30549	2.76	0.0445	0.0119	0.0066	31327	2.74	0.0396	0.0122	0.0067
Z_S_3	10	14643	2.31	0.1052	0.0066	0.0040	16588	2.3	0.0421	0.0067	0.0038	17014	2.29	0.0378	0.0068	0.0039
Z_N_4	10	12361	3.33	0.0963	0.0057	0.0035	13961	3.31	0.0379	0.0058	0.0033	14313	3.28	0.0342	0.0059	0.0033
AA_B_1	40	9292	5.45	0.0426	0.0042	0.0024	12397	4.62	0.0188	0.0051	0.0028	12669	4.63	0.0167	0.0052	0.0029
AA_B_2	10	9292	5.45	0.0841	0.0046	0.0029	12397	4.62	0.0366	0.0053	0.0030	12669	4.63	0.0333	0.0054	0.0031
AA_B_3	10	9292	5.45	0.0841	0.0046	0.0029	12397	4.62	0.0366	0.0053	0.0030	12669	4.63	0.0333	0.0054	0.0031
AB_B_1	10	17638	2.95	0.1335	0.0081	0.0050	20809	2.79	0.0546	0.0085	0.0048	21323	2.82	0.0493	0.0086	0.0049
AD_S_1	40	7421	9.89	0.0394	0.0037	0.0022	8243	9.89	0.0138	0.0038	0.0021	8456	9.9	0.0126	0.0039	0.0021
AD_N_2	10	5424	13.26	0.0743	0.0034	0.0021	6019	13.29	0.0270	0.0032	0.0018	6180	13.3	0.0255	0.0032	0.0018
AD_S_3	10	7421	9.89	0.0868	0.0042	0.0026	8243	9.89	0.0321	0.0040	0.0023	8456	9.9	0.0299	0.0041	0.0023
AD_B_4	10	12845	11.31	0.1611	0.0076	0.0048	14262	11.32	0.0591	0.0072	0.0041	14636	11.34	0.0555	0.0074	0.0042
AE_W_1	10	21227	2.73	0.1579	0.0096	0.0059	24655	2.62	0.0639	0.0100	0.0057	25272	2.64	0.0576	0.0102	0.0058
AE_B_2	10	21227	2.73	0.1579	0.0096	0.0059	24655	2.62	0.0639	0.0100	0.0057	25272	2.64	0.0576	0.0102	0.0058
AF_S_2	10	8324	8.73	0.0916	0.0046	0.0029	9285	8.69	0.0341	0.0044	0.0025	9527	8.7	0.0317	0.0045	0.0026
AH_N_2	40	8001	8.16	0.0402	0.0039	0.0023	8925	8.15	0.0145	0.0040	0.0022	9153	8.18	0.0131	0.0041	0.0022
AI_B_1	40	3876	2.84	0.0161	0.0016	0.0009	4279	3.25	0.0063	0.0017	0.0009	4389	3.17	0.0056	0.0017	0.0010



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AJ_B_1	10	10144	3.04	0.0773	0.0047	0.0029	11171	3.22	0.0302	0.0046	0.0026	11472	3.14	0.0272	0.0047	0.0027
AG_B_1	40	18416	2.31	0.0751	0.0076	0.0044	21624	2.21	0.0311	0.0083	0.0046	22159	2.18	0.0276	0.0085	0.0047
BB_E_1	10	20339	2.89	0.1532	0.0093	0.0057	23517	2.78	0.0617	0.0096	0.0055	24105	2.8	0.0557	0.0098	0.0056
BB_E_2	40	20339	2.89	0.0849	0.0085	0.0050	23517	2.78	0.0342	0.0092	0.0051	24105	2.8	0.0305	0.0094	0.0052
AS_E_1	10	7468	4.86	0.0650	0.0036	0.0023	8216	4.86	0.0246	0.0035	0.0020	8433	4.86	0.0225	0.0036	0.0021
AS_W_2	40	9341	4.18	0.0409	0.0041	0.0024	10277	4.17	0.0154	0.0042	0.0023	10548	4.17	0.0138	0.0043	0.0023
A_S_2	10	7387	6.28	0.0705	0.0038	0.0023	8222	6.2	0.0266	0.0037	0.0021	8437	6.21	0.0245	0.0037	0.0021
AP_S_1	10	8999	4.54	0.0766	0.0043	0.0027	9996	4.5	0.0293	0.0043	0.0024	10257	4.5	0.0267	0.0044	0.0025
AP_N_2	10	9161	5.36	0.0825	0.0045	0.0028	10203	5.29	0.0313	0.0044	0.0025	10469	5.29	0.0287	0.0045	0.0026
A_N_3	10	6697	6.76	0.0659	0.0035	0.0022	7493	6.65	0.0248	0.0034	0.0019	7687	6.66	0.0229	0.0035	0.0020
A_S_4	10	7387	6.28	0.0705	0.0038	0.0023	8222	6.2	0.0266	0.0037	0.0021	8437	6.21	0.0245	0.0037	0.0021
AP_N_3	40	9161	5.36	0.0419	0.0041	0.0024	10203	5.29	0.0157	0.0043	0.0023	10469	5.29	0.0141	0.0044	0.0024
BA_B_1	40	17068	2.71	0.0707	0.0071	0.0041	18777	2.71	0.0273	0.0073	0.0040	19273	2.71	0.0243	0.0075	0.0041
AZ_B_1	10	18621	3.14	0.1430	0.0086	0.0053	20486	3.14	0.0550	0.0084	0.0048	21026	3.14	0.0498	0.0086	0.0049
AZ_W_2	10	9212	3.37	0.0720	0.0043	0.0026	10135	3.36	0.0276	0.0042	0.0024	10402	3.36	0.0250	0.0043	0.0024
AZ_E_3	10	9409	2.92	0.0710	0.0043	0.0027	10351	2.93	0.0274	0.0042	0.0024	10624	2.93	0.0248	0.0043	0.0025
R_E_2	10	9243	2.86	0.0695	0.0042	0.0026	10169	2.85	0.0268	0.0042	0.0024	10437	2.86	0.0242	0.0042	0.0024
AX_N_1	10	8395	3.3	0.0653	0.0039	0.0024	9236	3.3	0.0251	0.0038	0.0022	9479	3.3	0.0227	0.0039	0.0022
A_N_5	10	6697	6.76	0.0659	0.0035	0.0022	7493	6.65	0.0248	0.0034	0.0019	7687	6.66	0.0229	0.0035	0.0020
A_N_6	10	6697	6.76	0.0659	0.0035	0.0022	7493	6.65	0.0248	0.0034	0.0019	7687	6.66	0.0229	0.0035	0.0020
Z_B_5	40	27004	2.77	0.1122	0.0113	0.0066	30549	2.76	0.0445	0.0119	0.0066	31327	2.74	0.0396	0.0122	0.0067
Z_B_6	40	27004	2.77	0.1122	0.0113	0.0066	30549	2.76	0.0445	0.0119	0.0066	31327	2.74	0.0396	0.0122	0.0067
E_B_2	40	18198	2.76	0.0756	0.0076	0.0044	20835	2.65	0.0303	0.0081	0.0045	21363	2.66	0.0269	0.0083	0.0046
E_B_3	40	18198	2.76	0.0756	0.0076	0.0044	20835	2.65	0.0303	0.0081	0.0045	21363	2.66	0.0269	0.0083	0.0046
E_B_4	40	18198	2.76	0.0756	0.0076	0.0044	20835	2.65	0.0303	0.0081	0.0045	21363	2.66	0.0269	0.0083	0.0046
E_B_5	40	18198	2.76	0.0756	0.0076	0.0044	20835	2.65	0.0303	0.0081	0.0045	21363	2.66	0.0269	0.0083	0.0046
E_B_6	40	18198	2.76	0.0756	0.0076	0.0044	20835	2.65	0.0303	0.0081	0.0045	21363	2.66	0.0269	0.0083	0.0046
E_B_7	40	18198	2.76	0.0756	0.0076	0.0044	20835	2.65	0.0303	0.0081	0.0045	21363	2.66	0.0269	0.0083	0.0046
E_B_8	40	18198	2.76	0.0756	0.0076	0.0044	20835	2.65	0.0303	0.0081	0.0045	21363	2.66	0.0269	0.0083	0.0046
Q_B_2	10	14565	2.13	0.1031	0.0065	0.0040	16024	2.13	0.0402	0.0064	0.0037	16446	2.13	0.0361	0.0065	0.0037
Q_B_3	40	14565	2.13	0.0590	0.0060	0.0035	16024	2.13	0.0230	0.0062	0.0034	16446	2.13	0.0205	0.0063	0.0035
Q_B_4	40	14565	2.13	0.0590	0.0060	0.0035	16024	2.13	0.0230	0.0062	0.0034	16446	2.13	0.0205	0.0063	0.0035
Q_B_5	40	14565	2.13	0.0590	0.0060	0.0035	16024	2.13	0.0230	0.0062	0.0034	16446	2.13	0.0205	0.0063	0.0035
Q_B_6	40	14565	2.13	0.0590	0.0060	0.0035	16024	2.13	0.0230	0.0062	0.0034	16446	2.13	0.0205	0.0063	0.0035
Q_B_7	40	14565	2.13	0.0590	0.0060	0.0035	16024	2.13	0.0230	0.0062	0.0034	16446	2.13	0.0205	0.0063	0.0035
Q_B_8	40	14565	2.13	0.0590	0.0060	0.0035	16024	2.13	0.0230	0.0062	0.0034	16446	2.13	0.0205	0.0063	0.0035



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Q_B_9	40	14565	2.13	0.0590	0.0060	0.0035	16024	2.13	0.0230	0.0062	0.0034	16446	2.13	0.0205	0.0063	0.0035
Q_B_10	40	14565	2.13	0.0590	0.0060	0.0035	16024	2.13	0.0230	0.0062	0.0034	16446	2.13	0.0205	0.0063	0.0035
AZ_B_4	40	18621	3.14	0.0785	0.0078	0.0046	20486	3.14	0.0301	0.0081	0.0045	21026	3.14	0.0268	0.0083	0.0046
AZ_B_5	40	18621	3.14	0.0785	0.0078	0.0046	20486	3.14	0.0301	0.0081	0.0045	21026	3.14	0.0268	0.0083	0.0046
AZ_B_6	10	18621	3.14	0.1430	0.0086	0.0053	20486	3.14	0.0550	0.0084	0.0048	21026	3.14	0.0498	0.0086	0.0049
AZ_B_7	40	18621	3.14	0.0785	0.0078	0.0046	20486	3.14	0.0301	0.0081	0.0045	21026	3.14	0.0268	0.0083	0.0046
BA_B_2	10	17068	2.71	0.1267	0.0077	0.0048	18777	2.71	0.0490	0.0076	0.0044	19273	2.71	0.0442	0.0078	0.0044
BA_B_3	40	17068	2.71	0.0707	0.0071	0.0041	18777	2.71	0.0273	0.0073	0.0040	19273	2.71	0.0243	0.0075	0.0041
BA_B_4	40	17068	2.71	0.0707	0.0071	0.0041	18777	2.71	0.0273	0.0073	0.0040	19273	2.71	0.0243	0.0075	0.0041
BA_B_5	40	17068	2.71	0.0707	0.0071	0.0041	18777	2.71	0.0273	0.0073	0.0040	19273	2.71	0.0243	0.0075	0.0041
BA_B_6	40	17068	2.71	0.0707	0.0071	0.0041	18777	2.71	0.0273	0.0073	0.0040	19273	2.71	0.0243	0.0075	0.0041
I_B_4	40	14840	2.48	0.0609	0.0061	0.0036	16488	2.46	0.0238	0.0064	0.0035	16918	2.46	0.0212	0.0065	0.0036
I_B_5	40	14840	2.48	0.0609	0.0061	0.0036	16488	2.46	0.0238	0.0064	0.0035	16918	2.46	0.0212	0.0065	0.0036
I_B_6	40	14840	2.48	0.0609	0.0061	0.0036	16488	2.46	0.0238	0.0064	0.0035	16918	2.46	0.0212	0.0065	0.0036
I_B_7	40	14840	2.48	0.0609	0.0061	0.0036	16488	2.46	0.0238	0.0064	0.0035	16918	2.46	0.0212	0.0065	0.0036
I_B_8	40	14840	2.48	0.0609	0.0061	0.0036	16488	2.46	0.0238	0.0064	0.0035	16918	2.46	0.0212	0.0065	0.0036
I_B_9	40	14840	2.48	0.0609	0.0061	0.0036	16488	2.46	0.0238	0.0064	0.0035	16918	2.46	0.0212	0.0065	0.0036
I_B_10	40	14840	2.48	0.0609	0.0061	0.0036	16488	2.46	0.0238	0.0064	0.0035	16918	2.46	0.0212	0.0065	0.0036
J_B_8	10	17349	3.01	0.1319	0.0080	0.0049	19248	2.98	0.0512	0.0079	0.0045	19752	2.98	0.0462	0.0080	0.0046
J_B_9	40	17349	3.01	0.0727	0.0073	0.0042	19248	2.98	0.0281	0.0076	0.0042	19752	2.98	0.0251	0.0077	0.0043
J_B_10	40	17349	3.01	0.0727	0.0073	0.0042	19248	2.98	0.0281	0.0076	0.0042	19752	2.98	0.0251	0.0077	0.0043
J_B_11	40	17349	3.01	0.0727	0.0073	0.0042	19248	2.98	0.0281	0.0076	0.0042	19752	2.98	0.0251	0.0077	0.0043
J_B_12	40	17349	3.01	0.0727	0.0073	0.0042	19248	2.98	0.0281	0.0076	0.0042	19752	2.98	0.0251	0.0077	0.0043
G_E_3	10	14510	2.34	0.1045	0.0065	0.0040	17545	2.13	0.0440	0.0070	0.0040	17966	2.13	0.0394	0.0071	0.0041
G_E_4	40	14510	2.34	0.0593	0.0060	0.0035	17545	2.13	0.0252	0.0067	0.0037	17966	2.13	0.0224	0.0069	0.0038
G_E_5	40	14510	2.34	0.0593	0.0060	0.0035	17545	2.13	0.0252	0.0067	0.0037	17966	2.13	0.0224	0.0069	0.0038
H_E_3	10	14629	2.73	0.1088	0.0066	0.0041	17485	2.51	0.0450	0.0071	0.0040	17910	2.52	0.0405	0.0072	0.0041
H_E_4	40	14629	2.73	0.0607	0.0061	0.0035	17485	2.51	0.0253	0.0068	0.0038	17910	2.52	0.0225	0.0069	0.0038
H_W_5	40	15712	2.62	0.0649	0.0065	0.0038	18783	2.41	0.0271	0.0073	0.0040	19239	2.42	0.0241	0.0074	0.0041
H_W_6	40	15712	2.62	0.0649	0.0065	0.0038	18783	2.41	0.0271	0.0073	0.0040	19239	2.42	0.0241	0.0074	0.0041
G_W_6	10	14848	2.45	0.1079	0.0067	0.0041	17840	2.24	0.0451	0.0072	0.0041	18271	2.25	0.0404	0.0073	0.0041
G_W_7	40	14848	2.45	0.0609	0.0061	0.0036	17840	2.24	0.0257	0.0069	0.0038	18271	2.25	0.0228	0.0070	0.0039
G_W_8	40	14848	2.45	0.0609	0.0061	0.0036	17840	2.24	0.0257	0.0069	0.0038	18271	2.25	0.0228	0.0070	0.0039
M_W_4	10	15823	2.17	0.1124	0.0070	0.0043	18685	2.02	0.0465	0.0074	0.0043	19144	2.02	0.0416	0.0076	0.0043
M_W_5	40	15823	2.17	0.0642	0.0065	0.0038	18685	2.02	0.0268	0.0072	0.0040	19144	2.02	0.0238	0.0073	0.0040
AE_B_3	10	21227	2.73	0.1579	0.0096	0.0059	24655	2.62	0.0639	0.0100	0.0057	25272	2.64	0.0576	0.0102	0.0058



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AE_B_4	40	21227	2.73	0.0880	0.0088	0.0051	24655	2.62	0.0358	0.0096	0.0053	25272	2.64	0.0318	0.0098	0.0054
AE_B_5	40	21227	2.73	0.0880	0.0088	0.0051	24655	2.62	0.0358	0.0096	0.0053	25272	2.64	0.0318	0.0098	0.0054
BB_E_3	40	20339	2.89	0.0849	0.0085	0.0050	23517	2.78	0.0342	0.0092	0.0051	24105	2.8	0.0305	0.0094	0.0052
BB_E_4	10	20339	2.89	0.1532	0.0093	0.0057	23517	2.78	0.0617	0.0096	0.0055	24105	2.8	0.0557	0.0098	0.0056
BB_E_5	40	20339	2.89	0.0849	0.0085	0.0050	23517	2.78	0.0342	0.0092	0.0051	24105	2.8	0.0305	0.0094	0.0052
C_W_6	10	17983	3.38	0.1407	0.0083	0.0052	20313	3.29	0.0551	0.0084	0.0048	20834	3.3	0.0499	0.0086	0.0049
C_E_7	40	13281	3.37	0.0565	0.0056	0.0033	14655	3.36	0.0216	0.0058	0.0032	15041	3.36	0.0193	0.0060	0.0033
C_E_8	40	13281	3.37	0.0565	0.0056	0.0033	14655	3.36	0.0216	0.0058	0.0032	15041	3.36	0.0193	0.0060	0.0033
C_W_9	40	17983	3.38	0.0765	0.0076	0.0044	20313	3.29	0.0299	0.0080	0.0044	20834	3.3	0.0267	0.0082	0.0045
C_B_10	40	31264	3.37	0.1329	0.0133	0.0077	34968	3.32	0.0515	0.0139	0.0077	35875	3.32	0.0460	0.0142	0.0078
C_E_11	10	13281	3.37	0.1038	0.0062	0.0038	14655	3.36	0.0399	0.0061	0.0035	15041	3.36	0.0362	0.0062	0.0035
C_W_12	40	17983	3.38	0.0765	0.0076	0.0044	20313	3.29	0.0299	0.0080	0.0044	20834	3.3	0.0267	0.0082	0.0045
C_E_13	10	13281	3.37	0.1038	0.0062	0.0038	14655	3.36	0.0399	0.0061	0.0035	15041	3.36	0.0362	0.0062	0.0035
C_W_14	10	17983	3.38	0.1407	0.0083	0.0052	20313	3.29	0.0551	0.0084	0.0048	20834	3.3	0.0499	0.0086	0.0049
C_E_15	40	13281	3.37	0.0565	0.0056	0.0033	14655	3.36	0.0216	0.0058	0.0032	15041	3.36	0.0193	0.0060	0.0033
C_W_16	10	17983	3.38	0.1407	0.0083	0.0052	20313	3.29	0.0551	0.0084	0.0048	20834	3.3	0.0499	0.0086	0.0049
AF_N_3	10	7758	9.93	0.0909	0.0044	0.0028	8771	9.79	0.0339	0.0043	0.0024	8999	9.7	0.0315	0.0044	0.0025
AF_S_4	10	8324	8.73	0.0916	0.0046	0.0029	9285	8.69	0.0341	0.0044	0.0025	9527	8.7	0.0317	0.0045	0.0026
AH_S_3	40	8999	6.77	0.0432	0.0042	0.0024	10012	6.74	0.0158	0.0043	0.0024	10276	6.78	0.0143	0.0044	0.0024
AH_N_4	40	8001	8.16	0.0402	0.0039	0.0023	8925	8.15	0.0145	0.0040	0.0022	9153	8.18	0.0131	0.0041	0.0022
AH_N_5	10	8001	8.16	0.0853	0.0043	0.0027	8925	8.15	0.0319	0.0042	0.0024	9153	8.18	0.0297	0.0043	0.0024
AH_S_6	40	8999	6.77	0.0432	0.0042	0.0024	10012	6.74	0.0158	0.0043	0.0024	10276	6.78	0.0143	0.0044	0.0024
W_B_2	40	8771	1.92	0.0352	0.0036	0.0021	9872	2.09	0.0142	0.0038	0.0021	10122	2.04	0.0126	0.0039	0.0021
W_B_3	40	8771	1.92	0.0352	0.0036	0.0021	9872	2.09	0.0142	0.0038	0.0021	10122	2.04	0.0126	0.0039	0.0021
W_B_4	40	8771	1.92	0.0352	0.0036	0.0021	9872	2.09	0.0142	0.0038	0.0021	10122	2.04	0.0126	0.0039	0.0021
W_B_5	40	8771	1.92	0.0352	0.0036	0.0021	9872	2.09	0.0142	0.0038	0.0021	10122	2.04	0.0126	0.0039	0.0021
W_B_6	40	8771	1.92	0.0352	0.0036	0.0021	9872	2.09	0.0142	0.0038	0.0021	10122	2.04	0.0126	0.0039	0.0021
W_B_7	40	8771	1.92	0.0352	0.0036	0.0021	9872	2.09	0.0142	0.0038	0.0021	10122	2.04	0.0126	0.0039	0.0021
P_B_2	40	5097	1.24	0.0199	0.0020	0.0012	5806	1.19	0.0082	0.0022	0.0012	5954	1.19	0.0072	0.0022	0.0012
P_B_3	40	5097	1.24	0.0199	0.0020	0.0012	5806	1.19	0.0082	0.0022	0.0012	5954	1.19	0.0072	0.0022	0.0012
P_B_4	40	5097	1.24	0.0199	0.0020	0.0012	5806	1.19	0.0082	0.0022	0.0012	5954	1.19	0.0072	0.0022	0.0012
P_B_5	40	5097	1.24	0.0199	0.0020	0.0012	5806	1.19	0.0082	0.0022	0.0012	5954	1.19	0.0072	0.0022	0.0012
B_B_2	40	3714	0.65	0.0141	0.0015	0.0008	4181	0.62	0.0058	0.0015	0.0009	4289	0.63	0.0051	0.0016	0.0009
B_B_3	40	3714	0.65	0.0141	0.0015	0.0008	4181	0.62	0.0058	0.0015	0.0009	4289	0.63	0.0051	0.0016	0.0009
B_B_4	40	3714	0.65	0.0141	0.0015	0.0008	4181	0.62	0.0058	0.0015	0.0009	4289	0.63	0.0051	0.0016	0.0009
B_B_5	40	3714	0.65	0.0141	0.0015	0.0008	4181	0.62	0.0058	0.0015	0.0009	4289	0.63	0.0051	0.0016	0.0009



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B_B_6	40	3714	0.65	0.0141	0.0015	0.0008	4181	0.62	0.0058	0.0015	0.0009	4289	0.63	0.0051	0.0016	0.0009
B_B_7	40	3714	0.65	0.0141	0.0015	0.0008	4181	0.62	0.0058	0.0015	0.0009	4289	0.63	0.0051	0.0016	0.0009
B_B_8	40	3714	0.65	0.0141	0.0015	0.0008	4181	0.62	0.0058	0.0015	0.0009	4289	0.63	0.0051	0.0016	0.0009
B_B_9	40	3714	0.65	0.0141	0.0015	0.0008	4181	0.62	0.0058	0.0015	0.0009	4289	0.63	0.0051	0.0016	0.0009
B_B_10	40	3714	0.65	0.0141	0.0015	0.0008	4181	0.62	0.0058	0.0015	0.0009	4289	0.63	0.0051	0.0016	0.0009
B_B_11	40	3714	0.65	0.0141	0.0015	0.0008	4181	0.62	0.0058	0.0015	0.0009	4289	0.63	0.0051	0.0016	0.0009
T_E_3	10	9562	6.35	0.0917	0.0049	0.0030	11694	5.71	0.0368	0.0052	0.0029	11972	5.72	0.0337	0.0053	0.0030
T_W_4	10	10015	5.48	0.0909	0.0050	0.0031	11671	5.18	0.0356	0.0051	0.0029	11962	5.18	0.0326	0.0052	0.0029
T_W_5	10	10015	5.48	0.0909	0.0050	0.0031	11671	5.18	0.0356	0.0051	0.0029	11962	5.18	0.0326	0.0052	0.0029
T_E_6	40	9562	6.35	0.0453	0.0044	0.0026	11694	5.71	0.0181	0.0049	0.0027	11972	5.72	0.0162	0.0050	0.0028
T_W_7	10	10015	5.48	0.0909	0.0050	0.0031	11671	5.18	0.0356	0.0051	0.0029	11962	5.18	0.0326	0.0052	0.0029
T_E_8	40	9562	6.35	0.0453	0.0044	0.0026	11694	5.71	0.0181	0.0049	0.0027	11972	5.72	0.0162	0.0050	0.0028
T_W_9	40	10015	5.48	0.0460	0.0045	0.0026	11671	5.18	0.0179	0.0049	0.0027	11962	5.18	0.0160	0.0050	0.0027
T_E_10	10	9562	6.35	0.0917	0.0049	0.0030	11694	5.71	0.0368	0.0052	0.0029	11972	5.72	0.0337	0.0053	0.0030
T_W_11	40	10015	5.48	0.0460	0.0045	0.0026	11671	5.18	0.0179	0.0049	0.0027	11962	5.18	0.0160	0.0050	0.0027
AS_E_3	40	7468	4.86	0.0336	0.0033	0.0019	8216	4.86	0.0125	0.0034	0.0019	8433	4.86	0.0112	0.0035	0.0019
AS_W_4	10	9341	4.18	0.0775	0.0045	0.0028	10277	4.17	0.0295	0.0043	0.0025	10548	4.17	0.0269	0.0044	0.0025
AS_E_5	40	7468	4.86	0.0336	0.0033	0.0019	8216	4.86	0.0125	0.0034	0.0019	8433	4.86	0.0112	0.0035	0.0019
AS_E_6	40	7468	4.86	0.0336	0.0033	0.0019	8216	4.86	0.0125	0.0034	0.0019	8433	4.86	0.0112	0.0035	0.0019
AS_W_7	40	9341	4.18	0.0409	0.0041	0.0024	10277	4.17	0.0154	0.0042	0.0023	10548	4.17	0.0138	0.0043	0.0023
R_B_3	40	19255	2.79	0.0800	0.0080	0.0047	21184	2.79	0.0309	0.0083	0.0046	21742	2.79	0.0275	0.0085	0.0047
R_B_4	10	19255	2.79	0.1439	0.0088	0.0054	21184	2.79	0.0556	0.0086	0.0049	21742	2.79	0.0502	0.0088	0.0050
R_B_5	40	19255	2.79	0.0800	0.0080	0.0047	21184	2.79	0.0309	0.0083	0.0046	21742	2.79	0.0275	0.0085	0.0047
R_B_6	40	19255	2.79	0.0800	0.0080	0.0047	21184	2.79	0.0309	0.0083	0.0046	21742	2.79	0.0275	0.0085	0.0047
R_B_7	40	19255	2.79	0.0800	0.0080	0.0047	21184	2.79	0.0309	0.0083	0.0046	21742	2.79	0.0275	0.0085	0.0047
A_B_7	40	14084	6.51	0.0671	0.0065	0.0038	15715	6.42	0.0247	0.0067	0.0037	16123	6.42	0.0222	0.0069	0.0038
A_B_8	40	14084	6.51	0.0671	0.0065	0.0038	15715	6.42	0.0247	0.0067	0.0037	16123	6.42	0.0222	0.0069	0.0038
A_B_9	40	14084	6.51	0.0671	0.0065	0.0038	15715	6.42	0.0247	0.0067	0.0037	16123	6.42	0.0222	0.0069	0.0038
A_B_10	40	14084	6.51	0.0671	0.0065	0.0038	15715	6.42	0.0247	0.0067	0.0037	16123	6.42	0.0222	0.0069	0.0038
AJ_B_2	40	10144	3.04	0.0426	0.0043	0.0025	11171	3.22	0.0164	0.0044	0.0024	11472	3.14	0.0146	0.0045	0.0025
AJ_B_3	10	10144	3.04	0.0773	0.0047	0.0029	11171	3.22	0.0302	0.0046	0.0026	11472	3.14	0.0272	0.0047	0.0027
AJ_B_4	40	10144	3.04	0.0426	0.0043	0.0025	11171	3.22	0.0164	0.0044	0.0024	11472	3.14	0.0146	0.0045	0.0025
AX_B_2	40	17242	3.24	0.0729	0.0073	0.0042	18969	3.24	0.0279	0.0075	0.0041	19469	3.24	0.0249	0.0077	0.0042
AX_S_3	10	8847	3.19	0.0682	0.0041	0.0025	9733	3.19	0.0262	0.0040	0.0023	9990	3.18	0.0237	0.0041	0.0023
R_W_8	10	10012	2.74	0.0745	0.0045	0.0028	11015	2.73	0.0288	0.0045	0.0026	11305	2.73	0.0260	0.0046	0.0026



Link ID	Speed (kph)	2029 With Development – Detailed Application 5					2032 With Development – Application 4					2032 With Development – Application 4 + Application 5				
		AADT	% HGV	NO _x (g/km/s)	PM ₁₀ (g/km/s)	PM _{2.5} (g/km/s)	AADT	% HGV	NO _x (g/km/s)	PM ₁₀ (g/km/s)	PM _{2.5} (g/km/s)	AADT	% HGV	NO _x (g/km/s)	PM ₁₀ (g/km/s)	PM _{2.5} (g/km/s)
A_B_1	10	16000	6.31	0.0520	0.0072	0.0041	16654	6.21	0.0483	0.0074	0.0042	17159	6.03	0.0492	0.0076	0.0043
B_B_1	40	4332	0.6	0.0060	0.0016	0.0009	4237	0.64	0.0051	0.0016	0.0009	4483	0.60	0.0054	0.0016	0.0009
AC_B_1	40	8833	1.17	0.0124	0.0033	0.0018	9082	1.13	0.0110	0.0034	0.0019	10810	0.95	0.0131	0.0040	0.0022
AC_B_2	40	8833	1.17	0.0124	0.0033	0.0018	9082	1.13	0.0110	0.0034	0.0019	10810	0.95	0.0131	0.0040	0.0022
AC_B_3	40	8833	1.17	0.0124	0.0033	0.0018	9082	1.13	0.0110	0.0034	0.0019	10810	0.95	0.0131	0.0040	0.0022
AC_B_4	40	8833	1.17	0.0124	0.0033	0.0018	9082	1.13	0.0110	0.0034	0.0019	10810	0.95	0.0131	0.0040	0.0022
C_W_1	40	20576	3.25	0.0303	0.0081	0.0045	21090	3.26	0.0270	0.0083	0.0046	21882	3.14	0.0279	0.0086	0.0047
C_E_2	10	15007	3.28	0.0407	0.0062	0.0035	15834	3.19	0.0376	0.0065	0.0037	16230	3.11	0.0383	0.0066	0.0038
C_B_3	40	35583	3.26	0.0523	0.0141	0.0078	36924	3.23	0.0472	0.0146	0.0080	38111	3.13	0.0486	0.0150	0.0083
C_W_4	40	20576	3.25	0.0303	0.0081	0.0045	21090	3.26	0.0270	0.0083	0.0046	21882	3.14	0.0279	0.0086	0.0047
C_E_5	40	15007	3.28	0.0221	0.0059	0.0033	15834	3.19	0.0202	0.0062	0.0034	16230	3.11	0.0207	0.0064	0.0035
E_B_1	10	20835	2.65	0.0541	0.0085	0.0048	20549	2.76	0.0473	0.0083	0.0047	21363	2.66	0.0488	0.0086	0.0049
F_W_1	10	22799	2.32	0.0579	0.0092	0.0052	22646	2.39	0.0507	0.0091	0.0052	24838	2.18	0.0547	0.0099	0.0056
F_E_2	10	16550	2.45	0.0424	0.0067	0.0038	16278	2.56	0.0369	0.0066	0.0037	18267	2.28	0.0405	0.0073	0.0041
G_W_1	10	18468	2.17	0.0464	0.0074	0.0042	18261	2.25	0.0404	0.0073	0.0041	20394	2.02	0.0443	0.0081	0.0046
G_E_2	10	18018	2.07	0.0450	0.0072	0.0041	17717	2.16	0.0389	0.0071	0.0040	19771	1.94	0.0427	0.0078	0.0044
H_W_1	10	19411	2.33	0.0493	0.0078	0.0045	19237	2.42	0.0431	0.0077	0.0044	21363	2.18	0.0470	0.0085	0.0048
H_E_2	40	17958	2.44	0.0260	0.0070	0.0038	17851	2.53	0.0224	0.0069	0.0038	19715	2.29	0.0246	0.0076	0.0042
I_S_1	10	8489	2.29	0.0215	0.0034	0.0019	8597	2.31	0.0191	0.0034	0.0020	8804	2.26	0.0195	0.0035	0.0020
I_N_2	10	8229	2.56	0.0213	0.0033	0.0019	8573	2.53	0.0194	0.0034	0.0020	8757	2.48	0.0197	0.0035	0.0020
I_B_3	10	16718	2.42	0.0428	0.0067	0.0038	17170	2.42	0.0385	0.0069	0.0039	17561	2.37	0.0392	0.0070	0.0040
J_S_1	40	10441	2.83	0.0152	0.0041	0.0023	10600	2.87	0.0134	0.0041	0.0023	10807	2.81	0.0137	0.0042	0.0023
J_N_2	40	9037	3.08	0.0132	0.0036	0.0020	9403	3.04	0.0120	0.0037	0.0020	9587	2.98	0.0122	0.0038	0.0021
J_B_3	40	19478	2.95	0.0285	0.0076	0.0042	20003	2.94	0.0254	0.0078	0.0043	20395	2.89	0.0259	0.0080	0.0044
J_N_4	10	9037	3.08	0.0242	0.0037	0.0021	9403	3.04	0.0221	0.0038	0.0022	9587	2.98	0.0224	0.0039	0.0022
J_S_5	10	10441	2.83	0.0275	0.0043	0.0024	10600	2.87	0.0246	0.0043	0.0024	10807	2.81	0.0250	0.0044	0.0025
J_B_6	10	19478	2.95	0.0517	0.0080	0.0046	20003	2.94	0.0467	0.0081	0.0046	20395	2.89	0.0474	0.0083	0.0047
J_B_7	40	19478	2.95	0.0285	0.0076	0.0042	20003	2.94	0.0254	0.0078	0.0043	20395	2.89	0.0259	0.0080	0.0044
K_S_1	10	15820	2.97	0.0420	0.0065	0.0037	14002	3.44	0.0339	0.0058	0.0033	16341	2.95	0.0382	0.0067	0.0038
K_B_2	40	36443	2.98	0.0533	0.0143	0.0079	33451	3.33	0.0429	0.0132	0.0073	37463	2.97	0.0476	0.0147	0.0081
K_N_3	10	20623	2.99	0.0548	0.0084	0.0048	19449	3.25	0.0464	0.0080	0.0045	21122	2.99	0.0495	0.0086	0.0049
K_S_4	10	15820	2.97	0.0420	0.0065	0.0037	14002	3.44	0.0339	0.0058	0.0033	16341	2.95	0.0382	0.0067	0.0038



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K_N_5	10	20623	2.99	0.0548	0.0084	0.0048	19449	3.25	0.0464	0.0080	0.0045	21122	2.99	0.0495	0.0086	0.0049
L_B_1	10	6165	6.1	0.0198	0.0027	0.0016	4106	9.4	0.0142	0.0020	0.0011	6271	6.16	0.0181	0.0028	0.0016
M_W_1	10	18948	1.99	0.0470	0.0075	0.0043	18651	2.07	0.0407	0.0074	0.0042	20191	1.92	0.0435	0.0080	0.0045
M_W_2	10	18948	1.99	0.0470	0.0075	0.0043	18651	2.07	0.0407	0.0074	0.0042	20191	1.92	0.0435	0.0080	0.0045
M_W_3	10	18948	1.99	0.0470	0.0075	0.0043	18651	2.07	0.0407	0.0074	0.0042	20191	1.92	0.0435	0.0080	0.0045
N_N_1	10	6039	11.24	0.0249	0.0030	0.0017	5995	11.63	0.0230	0.0030	0.0017	6193	11.25	0.0234	0.0031	0.0018
AH_S_1	10	10012	6.74	0.0333	0.0045	0.0026	10181	6.85	0.0307	0.0046	0.0026	10276	6.78	0.0308	0.0046	0.0026
N_N_2	10	6039	11.24	0.0249	0.0030	0.0017	5995	11.63	0.0230	0.0030	0.0017	6193	11.25	0.0234	0.0031	0.0018
AF_N_1	10	8771	9.79	0.0339	0.0043	0.0024	8764	9.96	0.0311	0.0043	0.0024	8999	9.7	0.0315	0.0044	0.0025
N_S_3	10	6110	11.23	0.0252	0.0031	0.0018	5985	11.78	0.0231	0.0030	0.0017	6264	11.25	0.0236	0.0031	0.0018
O_B_1	10	9775	13.38	0.0441	0.0052	0.0029	9920	13.54	0.0414	0.0052	0.0030	10030	13.39	0.0416	0.0053	0.0030
W_B_1	40	10023	2.06	0.0144	0.0038	0.0021	10673	1.93	0.0132	0.0041	0.0022	11022	1.87	0.0136	0.0042	0.0023
P_B_1	40	6717	1.03	0.0094	0.0025	0.0014	8131	0.87	0.0098	0.0030	0.0017	9240	0.77	0.0111	0.0034	0.0019
Q_B_1	40	16091	2.12	0.0231	0.0062	0.0034	17075	2.05	0.0212	0.0065	0.0036	17142	2.04	0.0213	0.0065	0.0036
R_B_1	40	21184	2.79	0.0308	0.0083	0.0046	21742	2.79	0.0275	0.0085	0.0047	21742	2.79	0.0275	0.0085	0.0047
S_B_1	40	17531	3.51	0.0259	0.0070	0.0039	16990	3.72	0.0220	0.0068	0.0037	18086	3.49	0.0233	0.0072	0.0040
T_E_1	10	11694	5.71	0.0368	0.0052	0.0029	10797	6.34	0.0316	0.0048	0.0027	11972	5.72	0.0337	0.0053	0.0030
T_W_2	10	11671	5.18	0.0356	0.0051	0.0029	11309	5.48	0.0314	0.0049	0.0028	11962	5.18	0.0326	0.0052	0.0029
X_B_1	40	2576	0.85	0.0036	0.0010	0.0005	4459	0.49	0.0053	0.0016	0.0009	4459	0.49	0.0053	0.0016	0.0009
Y_B_1	40	8027	2.19	0.0115	0.0031	0.0017	10356	1.7	0.0127	0.0039	0.0022	10985	1.6	0.0135	0.0041	0.0023
Z_N_1	10	13961	3.31	0.0379	0.0058	0.0033	15217	3.09	0.0359	0.0062	0.0035	15577	3.02	0.0366	0.0064	0.0036
Z_B_2	40	31177	2.71	0.0453	0.0122	0.0067	33272	2.58	0.0419	0.0129	0.0071	34715	2.47	0.0436	0.0134	0.0074
Z_S_3	10	17217	2.22	0.0434	0.0069	0.0039	18054	2.15	0.0396	0.0072	0.0041	19138	2.03	0.0416	0.0076	0.0043
Z_N_4	10	13961	3.31	0.0379	0.0058	0.0033	15217	3.09	0.0359	0.0062	0.0035	15577	3.02	0.0366	0.0064	0.0036
AA_B_1	40	12397	4.62	0.0188	0.0051	0.0028	10504	5.59	0.0142	0.0044	0.0024	12669	4.63	0.0167	0.0052	0.0029
AA_B_2	10	12397	4.62	0.0366	0.0053	0.0030	10504	5.59	0.0293	0.0046	0.0026	12669	4.63	0.0333	0.0054	0.0031
AA_B_3	10	12397	4.62	0.0366	0.0053	0.0030	10504	5.59	0.0293	0.0046	0.0026	12669	4.63	0.0333	0.0054	0.0031
AB_B_1	10	21642	2.68	0.0564	0.0088	0.0050	20870	2.88	0.0485	0.0085	0.0048	23105	2.61	0.0526	0.0093	0.0053
AD_S_1	40	8243	9.89	0.0138	0.0038	0.0021	8397	9.97	0.0125	0.0039	0.0021	8456	9.9	0.0125	0.0039	0.0021
AD_N_2	10	6019	13.29	0.0270	0.0032	0.0018	6129	13.41	0.0254	0.0032	0.0018	6180	13.3	0.0255	0.0032	0.0018
AD_S_3	10	8243	9.89	0.0320	0.0040	0.0023	8397	9.97	0.0298	0.0041	0.0023	8456	9.9	0.0299	0.0041	0.0023
AD_B_4	10	14262	11.32	0.0591	0.0072	0.0041	14526	11.42	0.0552	0.0073	0.0042	14636	11.34	0.0555	0.0074	0.0042
AE_W_1	10	24918	2.59	0.0645	0.0101	0.0058	24764	2.7	0.0567	0.0100	0.0057	26319	2.54	0.0596	0.0106	0.0060
AE_B_2	10	24918	2.59	0.0645	0.0101	0.0058	24764	2.7	0.0567	0.0100	0.0057	26319	2.54	0.0596	0.0106	0.0060
AF_S_2	10	9285	8.69	0.0341	0.0044	0.0025	9417	8.8	0.0315	0.0045	0.0025	9527	8.7	0.0317	0.0045	0.0026
AH_N_2	40	8925	8.15	0.0145	0.0040	0.0022	9028	8.3	0.0130	0.0040	0.0022	9153	8.18	0.0131	0.0041	0.0022



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AI_B_1	40	4279	3.25	0.0063	0.0017	0.0009	4389	3.17	0.0056	0.0017	0.0010	4389	3.17	0.0056	0.0017	0.0010
AJ_B_1	10	11171	3.22	0.0302	0.0046	0.0026	11472	3.14	0.0272	0.0047	0.0027	11472	3.14	0.0272	0.0047	0.0027
AG_B_1	40	21975	2.17	0.0316	0.0084	0.0047	21639	2.24	0.0270	0.0083	0.0046	23349	2.07	0.0290	0.0089	0.0049
BB_E_1	10	23869	2.74	0.0624	0.0097	0.0055	23811	2.83	0.0551	0.0097	0.0055	25294	2.67	0.0578	0.0102	0.0058
BB_E_2	40	23869	2.74	0.0347	0.0093	0.0052	23811	2.83	0.0301	0.0093	0.0051	25294	2.67	0.0319	0.0098	0.0054
AS_E_1	10	8216	4.86	0.0246	0.0035	0.0020	8433	4.86	0.0225	0.0036	0.0021	8433	4.86	0.0225	0.0036	0.0021
AS_W_2	40	10277	4.17	0.0154	0.0042	0.0023	10548	4.17	0.0138	0.0043	0.0023	10548	4.17	0.0138	0.0043	0.0023
A_S_2	10	8344	6.11	0.0268	0.0037	0.0021	8704	6.02	0.0250	0.0038	0.0022	8921	5.87	0.0253	0.0039	0.0022
AP_S_1	10	10118	4.45	0.0295	0.0043	0.0025	10524	4.39	0.0272	0.0045	0.0025	10742	4.3	0.0276	0.0045	0.0026
AP_N_2	10	10366	5.21	0.0317	0.0045	0.0026	10732	5.16	0.0292	0.0046	0.0026	11020	5.03	0.0297	0.0047	0.0027
A_N_3	10	7655	6.51	0.0252	0.0034	0.0020	7950	6.44	0.0234	0.0036	0.0020	8237	6.22	0.0239	0.0037	0.0021
A_S_4	10	8344	6.11	0.0268	0.0037	0.0021	8704	6.02	0.0250	0.0038	0.0022	8921	5.87	0.0253	0.0039	0.0022
AP_N_3	40	10366	5.21	0.0159	0.0043	0.0024	10732	5.16	0.0144	0.0044	0.0024	11020	5.03	0.0147	0.0046	0.0025
BA_B_1	40	18777	2.71	0.0273	0.0073	0.0040	19273	2.71	0.0243	0.0075	0.0041	19273	2.71	0.0243	0.0075	0.0041
AZ_B_1	10	20486	3.14	0.0550	0.0084	0.0048	21026	3.14	0.0498	0.0086	0.0049	21026	3.14	0.0498	0.0086	0.0049
AZ_W_2	10	10135	3.36	0.0276	0.0042	0.0024	10402	3.36	0.0250	0.0043	0.0024	10402	3.36	0.0250	0.0043	0.0024
AZ_E_3	10	10351	2.93	0.0274	0.0042	0.0024	10624	2.93	0.0248	0.0043	0.0025	10624	2.93	0.0248	0.0043	0.0025
R_E_2	10	10169	2.85	0.0268	0.0042	0.0024	10437	2.86	0.0242	0.0042	0.0024	10437	2.86	0.0242	0.0042	0.0024
AX_N_1	10	9236	3.3	0.0251	0.0038	0.0022	9479	3.3	0.0227	0.0039	0.0022	9479	3.3	0.0227	0.0039	0.0022
A_N_5	10	7655	6.51	0.0252	0.0034	0.0020	7950	6.44	0.0234	0.0036	0.0020	8237	6.22	0.0239	0.0037	0.0021
A_N_6	10	7655	6.51	0.0252	0.0034	0.0020	7950	6.44	0.0234	0.0036	0.0020	8237	6.22	0.0239	0.0037	0.0021
Z_B_5	40	31177	2.71	0.0453	0.0122	0.0067	33272	2.58	0.0419	0.0129	0.0071	34715	2.47	0.0436	0.0134	0.0074
Z_B_6	40	31177	2.71	0.0453	0.0122	0.0067	33272	2.58	0.0419	0.0129	0.0071	34715	2.47	0.0436	0.0134	0.0074
E_B_2	40	20835	2.65	0.0302	0.0081	0.0045	20549	2.76	0.0260	0.0080	0.0044	21363	2.66	0.0269	0.0083	0.0046
E_B_3	40	20835	2.65	0.0302	0.0081	0.0045	20549	2.76	0.0260	0.0080	0.0044	21363	2.66	0.0269	0.0083	0.0046
E_B_4	40	20835	2.65	0.0302	0.0081	0.0045	20549	2.76	0.0260	0.0080	0.0044	21363	2.66	0.0269	0.0083	0.0046
E_B_5	40	20835	2.65	0.0302	0.0081	0.0045	20549	2.76	0.0260	0.0080	0.0044	21363	2.66	0.0269	0.0083	0.0046
E_B_6	40	20835	2.65	0.0302	0.0081	0.0045	20549	2.76	0.0260	0.0080	0.0044	21363	2.66	0.0269	0.0083	0.0046
E_B_7	40	20835	2.65	0.0302	0.0081	0.0045	20549	2.76	0.0260	0.0080	0.0044	21363	2.66	0.0269	0.0083	0.0046
E_B_8	40	20835	2.65	0.0302	0.0081	0.0045	20549	2.76	0.0260	0.0080	0.0044	21363	2.66	0.0269	0.0083	0.0046
Q_B_2	10	16091	2.12	0.0403	0.0064	0.0037	17075	2.05	0.0372	0.0068	0.0039	17142	2.04	0.0373	0.0068	0.0039
Q_B_3	40	16091	2.12	0.0231	0.0062	0.0034	17075	2.05	0.0212	0.0065	0.0036	17142	2.04	0.0213	0.0065	0.0036
Q_B_4	40	16091	2.12	0.0231	0.0062	0.0034	17075	2.05	0.0212	0.0065	0.0036	17142	2.04	0.0213	0.0065	0.0036
Q_B_5	40	16091	2.12	0.0231	0.0062	0.0034	17075	2.05	0.0212	0.0065	0.0036	17142	2.04	0.0213	0.0065	0.0036
Q_B_6	40	16091	2.12	0.0231	0.0062	0.0034	17075	2.05	0.0212	0.0065	0.0036	17142	2.04	0.0213	0.0065	0.0036
Q_B_7	40	16091	2.12	0.0231	0.0062	0.0034	17075	2.05	0.0212	0.0065	0.0036	17142	2.04	0.0213	0.0065	0.0036



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Q_B_8	40	16091	2.12	0.0231	0.0062	0.0034	17075	2.05	0.0212	0.0065	0.0036	17142	2.04	0.0213	0.0065	0.0036
Q_B_9	40	16091	2.12	0.0231	0.0062	0.0034	17075	2.05	0.0212	0.0065	0.0036	17142	2.04	0.0213	0.0065	0.0036
Q_B_10	40	16091	2.12	0.0231	0.0062	0.0034	17075	2.05	0.0212	0.0065	0.0036	17142	2.04	0.0213	0.0065	0.0036
AZ_B_4	40	20486	3.14	0.0301	0.0081	0.0045	21026	3.14	0.0268	0.0083	0.0046	21026	3.14	0.0268	0.0083	0.0046
AZ_B_5	40	20486	3.14	0.0301	0.0081	0.0045	21026	3.14	0.0268	0.0083	0.0046	21026	3.14	0.0268	0.0083	0.0046
AZ_B_6	10	20486	3.14	0.0550	0.0084	0.0048	21026	3.14	0.0498	0.0086	0.0049	21026	3.14	0.0498	0.0086	0.0049
AZ_B_7	40	20486	3.14	0.0301	0.0081	0.0045	21026	3.14	0.0268	0.0083	0.0046	21026	3.14	0.0268	0.0083	0.0046
BA_B_2	10	18777	2.71	0.0490	0.0076	0.0044	19273	2.71	0.0442	0.0078	0.0044	19273	2.71	0.0442	0.0078	0.0044
BA_B_3	40	18777	2.71	0.0273	0.0073	0.0040	19273	2.71	0.0243	0.0075	0.0041	19273	2.71	0.0243	0.0075	0.0041
BA_B_4	40	18777	2.71	0.0273	0.0073	0.0040	19273	2.71	0.0243	0.0075	0.0041	19273	2.71	0.0243	0.0075	0.0041
BA_B_5	40	18777	2.71	0.0273	0.0073	0.0040	19273	2.71	0.0243	0.0075	0.0041	19273	2.71	0.0243	0.0075	0.0041
BA_B_6	40	18777	2.71	0.0273	0.0073	0.0040	19273	2.71	0.0243	0.0075	0.0041	19273	2.71	0.0243	0.0075	0.0041
I_B_4	40	16718	2.42	0.0242	0.0065	0.0036	17170	2.42	0.0215	0.0066	0.0037	17561	2.37	0.0220	0.0068	0.0037
I_B_5	40	16718	2.42	0.0242	0.0065	0.0036	17170	2.42	0.0215	0.0066	0.0037	17561	2.37	0.0220	0.0068	0.0037
I_B_6	40	16718	2.42	0.0242	0.0065	0.0036	17170	2.42	0.0215	0.0066	0.0037	17561	2.37	0.0220	0.0068	0.0037
I_B_7	40	16718	2.42	0.0242	0.0065	0.0036	17170	2.42	0.0215	0.0066	0.0037	17561	2.37	0.0220	0.0068	0.0037
I_B_8	40	16718	2.42	0.0242	0.0065	0.0036	17170	2.42	0.0215	0.0066	0.0037	17561	2.37	0.0220	0.0068	0.0037
I_B_9	40	16718	2.42	0.0242	0.0065	0.0036	17170	2.42	0.0215	0.0066	0.0037	17561	2.37	0.0220	0.0068	0.0037
I_B_10	40	16718	2.42	0.0242	0.0065	0.0036	17170	2.42	0.0215	0.0066	0.0037	17561	2.37	0.0220	0.0068	0.0037
J_B_8	10	19478	2.95	0.0517	0.0080	0.0046	20003	2.94	0.0467	0.0081	0.0046	20395	2.89	0.0474	0.0083	0.0047
J_B_9	40	19478	2.95	0.0285	0.0076	0.0042	20003	2.94	0.0254	0.0078	0.0043	20395	2.89	0.0259	0.0080	0.0044
J_B_10	40	19478	2.95	0.0285	0.0076	0.0042	20003	2.94	0.0254	0.0078	0.0043	20395	2.89	0.0259	0.0080	0.0044
J_B_11	40	19478	2.95	0.0285	0.0076	0.0042	20003	2.94	0.0254	0.0078	0.0043	20395	2.89	0.0259	0.0080	0.0044
J_B_12	40	19478	2.95	0.0285	0.0076	0.0042	20003	2.94	0.0254	0.0078	0.0043	20395	2.89	0.0259	0.0080	0.0044
G_E_3	10	18018	2.07	0.0450	0.0072	0.0041	17717	2.16	0.0389	0.0071	0.0040	19771	1.94	0.0427	0.0078	0.0044
G_E_4	40	18018	2.07	0.0258	0.0069	0.0038	17717	2.16	0.0221	0.0068	0.0037	19771	1.94	0.0245	0.0075	0.0042
G_E_5	40	18018	2.07	0.0258	0.0069	0.0038	17717	2.16	0.0221	0.0068	0.0037	19771	1.94	0.0245	0.0075	0.0042
H_E_3	10	17958	2.44	0.0460	0.0072	0.0041	17851	2.53	0.0404	0.0072	0.0041	19715	2.29	0.0438	0.0079	0.0045
H_E_4	40	17958	2.44	0.0260	0.0070	0.0038	17851	2.53	0.0224	0.0069	0.0038	19715	2.29	0.0246	0.0076	0.0042
H_W_5	40	19411	2.33	0.0280	0.0075	0.0041	19237	2.42	0.0241	0.0074	0.0041	21363	2.18	0.0266	0.0082	0.0045
H_W_6	40	19411	2.33	0.0280	0.0075	0.0041	19237	2.42	0.0241	0.0074	0.0041	21363	2.18	0.0266	0.0082	0.0045
G_W_6	10	18468	2.17	0.0464	0.0074	0.0042	18261	2.25	0.0404	0.0073	0.0041	20394	2.02	0.0443	0.0081	0.0046
G_W_7	40	18468	2.17	0.0265	0.0071	0.0039	18261	2.25	0.0228	0.0070	0.0039	20394	2.02	0.0253	0.0078	0.0043
G_W_8	40	18468	2.17	0.0265	0.0071	0.0039	18261	2.25	0.0228	0.0070	0.0039	20394	2.02	0.0253	0.0078	0.0043
M_W_4	10	18948	1.99	0.0470	0.0075	0.0043	18651	2.07	0.0407	0.0074	0.0042	20191	1.92	0.0435	0.0080	0.0045
M_W_5	40	18948	1.99	0.0271	0.0072	0.0040	18651	2.07	0.0232	0.0071	0.0039	20191	1.92	0.0250	0.0077	0.0042



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AE_B_3	10	24918	2.59	0.0645	0.0101	0.0058	24764	2.7	0.0567	0.0100	0.0057	26319	2.54	0.0596	0.0106	0.0060
AE_B_4	40	24918	2.59	0.0361	0.0097	0.0054	24764	2.7	0.0312	0.0096	0.0053	26319	2.54	0.0331	0.0102	0.0056
AE_B_5	40	24918	2.59	0.0361	0.0097	0.0054	24764	2.7	0.0312	0.0096	0.0053	26319	2.54	0.0331	0.0102	0.0056
BB_E_3	40	23869	2.74	0.0347	0.0093	0.0052	23811	2.83	0.0301	0.0093	0.0051	25294	2.67	0.0319	0.0098	0.0054
BB_E_4	10	23869	2.74	0.0624	0.0097	0.0055	23811	2.83	0.0551	0.0097	0.0055	25294	2.67	0.0578	0.0102	0.0058
BB_E_5	40	23869	2.74	0.0347	0.0093	0.0052	23811	2.83	0.0301	0.0093	0.0051	25294	2.67	0.0319	0.0098	0.0054
C_W_6	10	20576	3.25	0.0557	0.0085	0.0048	21090	3.26	0.0504	0.0087	0.0049	21882	3.14	0.0518	0.0090	0.0051
C_E_7	40	15007	3.28	0.0221	0.0059	0.0033	15834	3.19	0.0202	0.0062	0.0034	16230	3.11	0.0207	0.0064	0.0035
C_E_8	40	15007	3.28	0.0221	0.0059	0.0033	15834	3.19	0.0202	0.0062	0.0034	16230	3.11	0.0207	0.0064	0.0035
C_W_9	40	20576	3.25	0.0303	0.0081	0.0045	21090	3.26	0.0270	0.0083	0.0046	21882	3.14	0.0279	0.0086	0.0047
C_B_10	40	35583	3.26	0.0523	0.0141	0.0078	36924	3.23	0.0472	0.0146	0.0080	38111	3.13	0.0486	0.0150	0.0083
C_E_11	10	15007	3.28	0.0407	0.0062	0.0035	15834	3.19	0.0376	0.0065	0.0037	16230	3.11	0.0383	0.0066	0.0038
C_W_12	40	20576	3.25	0.0303	0.0081	0.0045	21090	3.26	0.0270	0.0083	0.0046	21882	3.14	0.0279	0.0086	0.0047
C_E_13	10	15007	3.28	0.0407	0.0062	0.0035	15834	3.19	0.0376	0.0065	0.0037	16230	3.11	0.0383	0.0066	0.0038
C_W_14	10	20576	3.25	0.0557	0.0085	0.0048	21090	3.26	0.0504	0.0087	0.0049	21882	3.14	0.0518	0.0090	0.0051
C_E_15	40	15007	3.28	0.0221	0.0059	0.0033	15834	3.19	0.0202	0.0062	0.0034	16230	3.11	0.0207	0.0064	0.0035
C_W_16	10	20576	3.25	0.0557	0.0085	0.0048	21090	3.26	0.0504	0.0087	0.0049	21882	3.14	0.0518	0.0090	0.0051
AF_N_3	10	8771	9.79	0.0339	0.0043	0.0024	8764	9.96	0.0311	0.0043	0.0024	8999	9.7	0.0315	0.0044	0.0025
AF_S_4	10	9285	8.69	0.0341	0.0044	0.0025	9417	8.8	0.0315	0.0045	0.0025	9527	8.7	0.0317	0.0045	0.0026
AH_S_3	40	10012	6.74	0.0158	0.0043	0.0024	10181	6.85	0.0141	0.0044	0.0024	10276	6.78	0.0143	0.0044	0.0024
AH_N_4	40	8925	8.15	0.0145	0.0040	0.0022	9028	8.3	0.0130	0.0040	0.0022	9153	8.18	0.0131	0.0041	0.0022
AH_N_5	10	8925	8.15	0.0319	0.0042	0.0024	9028	8.3	0.0295	0.0042	0.0024	9153	8.18	0.0297	0.0043	0.0024
AH_S_6	40	10012	6.74	0.0158	0.0043	0.0024	10181	6.85	0.0141	0.0044	0.0024	10276	6.78	0.0143	0.0044	0.0024
W_B_2	40	10023	2.06	0.0144	0.0038	0.0021	10673	1.93	0.0132	0.0041	0.0022	11022	1.87	0.0136	0.0042	0.0023
W_B_3	40	10023	2.06	0.0144	0.0038	0.0021	10673	1.93	0.0132	0.0041	0.0022	11022	1.87	0.0136	0.0042	0.0023
W_B_4	40	10023	2.06	0.0144	0.0038	0.0021	10673	1.93	0.0132	0.0041	0.0022	11022	1.87	0.0136	0.0042	0.0023
W_B_5	40	10023	2.06	0.0144	0.0038	0.0021	10673	1.93	0.0132	0.0041	0.0022	11022	1.87	0.0136	0.0042	0.0023
W_B_6	40	10023	2.06	0.0144	0.0038	0.0021	10673	1.93	0.0132	0.0041	0.0022	11022	1.87	0.0136	0.0042	0.0023
W_B_7	40	10023	2.06	0.0144	0.0038	0.0021	10673	1.93	0.0132	0.0041	0.0022	11022	1.87	0.0136	0.0042	0.0023
P_B_2	40	6717	1.03	0.0094	0.0025	0.0014	8131	0.87	0.0098	0.0030	0.0017	9240	0.77	0.0111	0.0034	0.0019
P_B_3	40	6717	1.03	0.0094	0.0025	0.0014	8131	0.87	0.0098	0.0030	0.0017	9240	0.77	0.0111	0.0034	0.0019
P_B_4	40	6717	1.03	0.0094	0.0025	0.0014	8131	0.87	0.0098	0.0030	0.0017	9240	0.77	0.0111	0.0034	0.0019
P_B_5	40	6717	1.03	0.0094	0.0025	0.0014	8131	0.87	0.0098	0.0030	0.0017	9240	0.77	0.0111	0.0034	0.0019
B_B_2	40	4332	0.6	0.0060	0.0016	0.0009	4237	0.64	0.0051	0.0016	0.0009	4483	0.6	0.0054	0.0016	0.0009
B_B_3	40	4332	0.6	0.0060	0.0016	0.0009	4237	0.64	0.0051	0.0016	0.0009	4483	0.6	0.0054	0.0016	0.0009
B_B_4	40	4332	0.6	0.0060	0.0016	0.0009	4237	0.64	0.0051	0.0016	0.0009	4483	0.6	0.0054	0.0016	0.0009



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B_B_5	40	4332	0.6	0.0060	0.0016	0.0009	4237	0.64	0.0051	0.0016	0.0009	4483	0.6	0.0054	0.0016	0.0009
B_B_6	40	4332	0.6	0.0060	0.0016	0.0009	4237	0.64	0.0051	0.0016	0.0009	4483	0.6	0.0054	0.0016	0.0009
B_B_7	40	4332	0.6	0.0060	0.0016	0.0009	4237	0.64	0.0051	0.0016	0.0009	4483	0.6	0.0054	0.0016	0.0009
B_B_8	40	4332	0.6	0.0060	0.0016	0.0009	4237	0.64	0.0051	0.0016	0.0009	4483	0.6	0.0054	0.0016	0.0009
B_B_9	40	4332	0.6	0.0060	0.0016	0.0009	4237	0.64	0.0051	0.0016	0.0009	4483	0.6	0.0054	0.0016	0.0009
AU_B_10	40	6278	0.41	0.0087	0.0023	0.0013	4237	0.64	0.0051	0.0016	0.0009	8520	0.32	0.0101	0.0031	0.0017
B_B_11	40	4332	0.6	0.0060	0.0016	0.0009	4237	0.64	0.0051	0.0016	0.0009	4483	0.6	0.0054	0.0016	0.0009
T_E_3	10	11694	5.71	0.0368	0.0052	0.0029	10797	6.34	0.0316	0.0048	0.0027	11972	5.72	0.0337	0.0053	0.0030
T_W_4	10	11671	5.18	0.0356	0.0051	0.0029	11309	5.48	0.0314	0.0049	0.0028	11962	5.18	0.0326	0.0052	0.0029
T_W_5	10	11671	5.18	0.0356	0.0051	0.0029	11309	5.48	0.0314	0.0049	0.0028	11962	5.18	0.0326	0.0052	0.0029
T_E_6	40	11694	5.71	0.0181	0.0049	0.0027	10797	6.34	0.0148	0.0046	0.0025	11972	5.72	0.0162	0.0050	0.0028
T_W_7	10	11671	5.18	0.0356	0.0051	0.0029	11309	5.48	0.0314	0.0049	0.0028	11962	5.18	0.0326	0.0052	0.0029
T_E_8	40	11694	5.71	0.0181	0.0049	0.0027	10797	6.34	0.0148	0.0046	0.0025	11972	5.72	0.0162	0.0050	0.0028
T_W_9	40	11671	5.18	0.0179	0.0049	0.0027	11309	5.48	0.0152	0.0047	0.0026	11962	5.18	0.0160	0.0050	0.0027
T_E_10	10	11694	5.71	0.0368	0.0052	0.0029	10797	6.34	0.0316	0.0048	0.0027	11972	5.72	0.0337	0.0053	0.0030
T_W_11	40	11671	5.18	0.0179	0.0049	0.0027	11309	5.48	0.0152	0.0047	0.0026	11962	5.18	0.0160	0.0050	0.0027
AS_E_3	40	8216	4.86	0.0125	0.0034	0.0019	8433	4.86	0.0112	0.0035	0.0019	8433	4.86	0.0112	0.0035	0.0019
AS_W_4	10	10277	4.17	0.0295	0.0043	0.0025	10548	4.17	0.0269	0.0044	0.0025	10548	4.17	0.0269	0.0044	0.0025
AS_E_5	40	8216	4.86	0.0125	0.0034	0.0019	8433	4.86	0.0112	0.0035	0.0019	8433	4.86	0.0112	0.0035	0.0019
AS_E_6	40	8216	4.86	0.0125	0.0034	0.0019	8433	4.86	0.0112	0.0035	0.0019	8433	4.86	0.0112	0.0035	0.0019
AS_W_7	40	10277	4.17	0.0154	0.0042	0.0023	10548	4.17	0.0138	0.0043	0.0023	10548	4.17	0.0138	0.0043	0.0023
R_B_3	40	21184	2.79	0.0308	0.0083	0.0046	21742	2.79	0.0275	0.0085	0.0047	21742	2.79	0.0275	0.0085	0.0047
R_B_4	10	21184	2.79	0.0556	0.0086	0.0049	21742	2.79	0.0502	0.0088	0.0050	21742	2.79	0.0502	0.0088	0.0050
R_B_5	40	21184	2.79	0.0308	0.0083	0.0046	21742	2.79	0.0275	0.0085	0.0047	21742	2.79	0.0275	0.0085	0.0047
R_B_6	40	21184	2.79	0.0308	0.0083	0.0046	21742	2.79	0.0275	0.0085	0.0047	21742	2.79	0.0275	0.0085	0.0047
R_B_7	40	21184	2.79	0.0308	0.0083	0.0046	21742	2.79	0.0275	0.0085	0.0047	21742	2.79	0.0275	0.0085	0.0047
A_B_7	40	16000	6.31	0.0250	0.0068	0.0038	16654	6.21	0.0228	0.0071	0.0039	17159	6.03	0.0234	0.0073	0.0040
A_B_8	40	16000	6.31	0.0250	0.0068	0.0038	16654	6.21	0.0228	0.0071	0.0039	17159	6.03	0.0234	0.0073	0.0040
A_B_9	40	16000	6.31	0.0250	0.0068	0.0038	16654	6.21	0.0228	0.0071	0.0039	17159	6.03	0.0234	0.0073	0.0040
A_B_10	40	16000	6.31	0.0250	0.0068	0.0038	16654	6.21	0.0228	0.0071	0.0039	17159	6.03	0.0234	0.0073	0.0040
AJ_B_2	40	11171	3.22	0.0164	0.0044	0.0024	11472	3.14	0.0146	0.0045	0.0025	11472	3.14	0.0146	0.0045	0.0025
AJ_B_3	10	11171	3.22	0.0302	0.0046	0.0026	11472	3.14	0.0272	0.0047	0.0027	11472	3.14	0.0272	0.0047	0.0027
AJ_B_4	40	11171	3.22	0.0164	0.0044	0.0024	11472	3.14	0.0146	0.0045	0.0025	11472	3.14	0.0146	0.0045	0.0025
AX_B_2	40	18969	3.24	0.0279	0.0075	0.0041	19469	3.24	0.0249	0.0077	0.0042	19469	3.24	0.0249	0.0077	0.0042
AX_S_3	10	9733	3.19	0.0262	0.0040	0.0023	9990	3.18	0.0237	0.0041	0.0023	9990	3.18	0.0237	0.0041	0.0023
R_W_8	10	11015	2.73	0.0288	0.0045	0.0026	11305	2.73	0.0260	0.0046	0.0026	11305	2.73	0.0260	0.0046	0.0026



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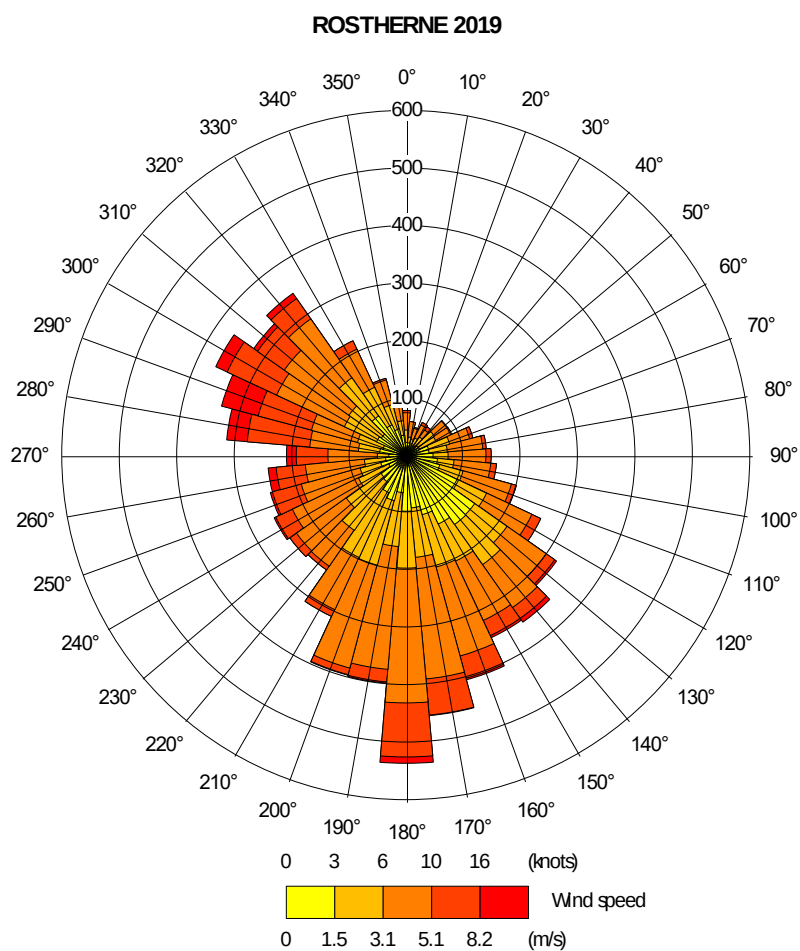
AV_E_1	40	1084	0	0.0015	0.0004	0.0002	-	-	-	-	-	1398	0	0.0016	0.0005	0.0003
BC_E_1	40	1448	0	0.0020	0.0005	0.0003	-	-	-	-	-	1867	0	0.0022	0.0007	0.0004
AT_B_10	40	5328	0.49	0.0074	0.0020	0.0011	-	-	-	-	-	6524	0.41	0.0078	0.0024	0.0013

Appendix 12.4

2019 Wind Rose for Rostherne

12.4 2019 Wind Rose for Rostherne

2019 meteorological data for the weather station at Rostherne was utilised in the detailed dispersion modelling. A copy of the wind-rose for this data set is provided below.



Appendix 12.5

Model Verification Calculations

12.5 Model Verification Calculations

Model Verification

The comparison of modelled concentrations with local monitored concentrations is a process termed 'verification'. Model verification investigates the discrepancies between modelled and measured concentrations, which can arise due to the presence of inaccuracies and/or uncertainties in model input data and also modelling and/or monitoring data assumptions. The following are examples of potential causes of such discrepancy:

- a) Estimates of background pollutant concentrations.
- b) Meteorological data uncertainties.
- c) Traffic data uncertainties.
- d) Model input parameters, such as 'roughness length'.
- e) Overall limitations of the dispersion model.

Nitrogen Dioxide

Most nitrogen dioxide is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of the primary pollutant emissions of nitrogen oxides ($\text{NO}_x = \text{NO} + \text{NO}_2$), in line with the guidance provided within LAQM.TG22.

The ADMS model has been run to predict the 2019 annual mean road- NO_x contribution at four roadside diffusion tubes within the modelled road network. The model outputs of road- NO_x have been compared with the 'measured' road- NO_x , which was determined from the NO_2 concentrations measured using diffusion tubes at the monitoring locations, utilising the NO_x from NO_2 calculator provided by Defra and the NO_2 background concentrations (from the Defra background maps).

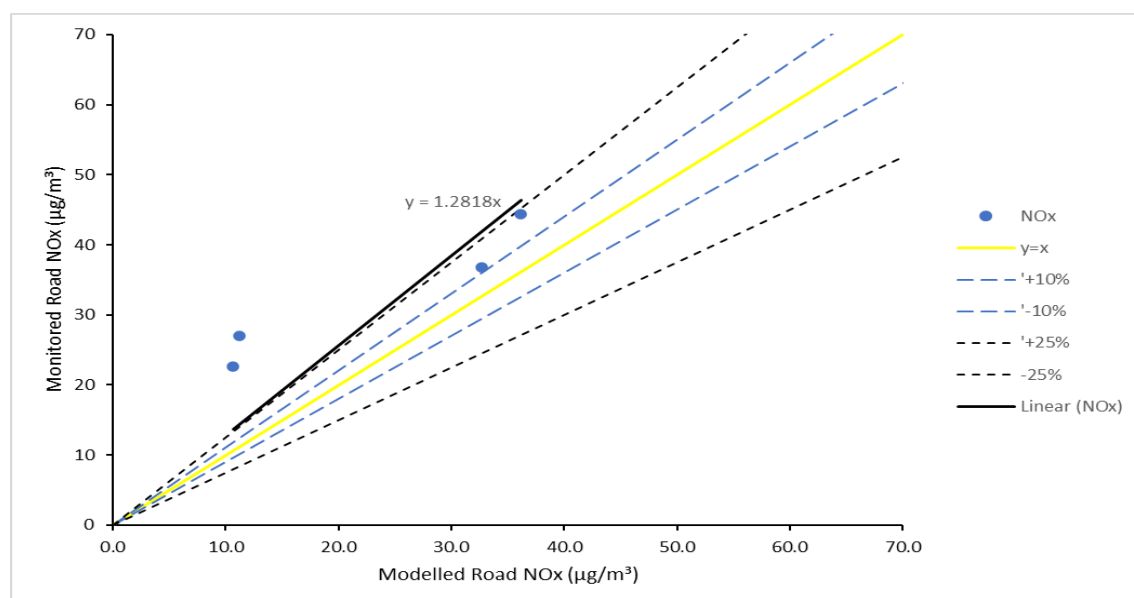
The road- NO_x adjustment factor was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero. The resultant factor was then applied to the modelled road- NO_x concentration for each monitoring site to provide adjusted modelled road- NO_x concentrations. The total nitrogen dioxide concentrations were then determined by inputting the adjusted modelled road- NO_x concentrations and the background NO_2 concentration into the NO_x to NO_2 calculator. The tables and figures overleaf present the data used in the verification calculations.

Table A5.5.1 Unadjusted NO₂ Verification Results

Monitoring Site	$\mu\text{g}/\text{m}^3$						% over/ Under Prediction
	2019 Monitored Total NO ₂	Background NO ₂	Monitored Road-NO _x ¹	Modelled Road NO _x	Ratio	Modelled Total NO ₂	
MA36NO	31.7	20.7	22.7	10.7	2.1	24.1	-23.9
MA71NO	45.3	25.5	44.4	36.1	1.2	39.1	-13.6
MA88NO	43.3	25.9	36.8	32.7	1.1	38.2	-11.7
SA14NO	31.6	18.2	27.0	11.2	2.4	22.4	-29.2

The data in Table A12.5.1 shows that the model was under-predicting at all monitoring sites considered. However, for three of the monitoring sites, the percentage difference between the modelled and monitored NO₂ concentrations was within 25%, which is generally acceptable. At the remaining location, the percentage difference was greater than 25%.

A comparison of the modelled road-NO_x against monitored road-NO_x was therefore undertaken (as shown in Figure A12.5.1), resulting in an adjustment factor of 1.28.

Figure A12.5.1: Comparison of Monitored Road-NO_x with Unadjusted Road-NO_x


The adjustment factor was applied to the model outputs for the diffusion tube locations and total NO₂ concentrations recalculated. The results are summarised in Table A12.5.2 below. They show that following adjustment, the level of under-prediction reduced. For all sites, the percentage difference between the monitored and the adjusted-modelled NO₂ concentrations is within 25%, which is acceptable. For two of the monitoring sites, the percentage difference is within 10%, which is ideal.

¹ From NO_x:NO₂ calculator.

Table A5.5.2: Adjusted NO₂ Verification Results

Monitoring Site	µg/m ³					% over/ Under Prediction
	2019 Monitored Total NO ₂	Background NO ₂	Monitored Road-NO _x	Adjusted Modelled Road-NO _x	Modelled Total NO ₂	
MA36NO	31.7	20.7	22.7	13.7	25.6	-19.3
MA71NO	45.3	25.5	44.4	46.3	43.3	-4.5
MA88NO	43.3	25.9	36.8	41.9	42.3	-2.3
SA14NO	31.6	18.2	27.0	14.4	24.0	-24.1

PM₁₀ and PM_{2.5}

No monitoring of PM₁₀ and/or PM_{2.5} is undertaken within the study area. Therefore, the adjustment factor calculated for NO_x has also been applied to the model outputs for these pollutants.

Model Uncertainty

An evaluation of model performance has been undertaken to establish confidence in model results. LAQM.TG22 identifies a number of statistical procedures that are appropriate to evaluate model performance and assess the uncertainty. These include:

- Root mean square error (RMSE);
- Fractional bias (FB); and
- Correlation coefficient (CC).

These parameters estimate how the model results agree or diverge from the observations. These calculations can be carried out prior to, and after adjustment, or based on different options for adjustment, and can provide useful information on model improvement. A brief explanation of each statistic is provided in the table below, and further details can be found in Box 7.21 of LAQM.TG22.

Table A12.5.3: Methods for Describing Model Uncertainty

Statistical Parameter	Comments	Ideal value
RMSE	RMSE is used to define the average error or uncertainty of the model. The units of RMSE are the same as the quantities compared. If the RMSE values are higher than 25% of the objective being assessed, it is recommended that the model inputs and verification should be revisited in	0.00

	order to make improvements. For example, if the model predictions are for the annual mean NO₂ objective of 40µg/m³, if an RMSE of 10µg/m³ or above is determined for a model it is advised to revisit the model parameters and model verification. Ideally an RMSE within 10% of the air quality objective would be derived, which equates to 4µg/m³ for the annual mean NO₂ objective.	
Fractional Bias	Used to identify if the model shows a systematic tendency to over or under predict. FB values vary between +2 and -2 and has an ideal value of zero. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.	0.00
Correlation Coefficient	Used to measure the linear relationship between predicted and observed data. A value of zero means no relationship and a value of 1 means absolute relationship. This statistic can be particularly useful when comparing a large number of model and observed data points.	1.00

To assess the uncertainty of a model, the RMSE is the simplest parameter to calculate providing an estimate of the average error of the model in the same units as the modelled predictions. It is also often easier to interpret the RMSE than the other statistical parameters and therefore it has been calculated in this assessment to understand the model uncertainty.

Prior to adjustment, the calculated RMSE was 7.2µg/m³. Following adjustment, this reduced to 5.0µg/m³. This is just outside the ideal range of 10% for model performance and well within the 25% range for acceptable performance. Therefore, in accordance with LAQM.TG22, the model predictions are considered robust.