

Tuggerah Gateway Rezoning Screening Air Quality Assessment

Prepared for Scentre Group

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Tuggerah Gateway Rezoning

Screening Air Quality Assessment

Scentre Group

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1 Introduction

Scentre Group is proposing to rezone and develop part of Lot 2 DP1056960 and Lot 3 DP1084221 at 68 Tonkiss Street and 60 Wyong Road, Tuggerah ('the project'). Following rezoning, the proposed works include construction of low-medium and medium-high rise residential buildings, mixed-use buildings, roads and services.

In December 2022 the Department of Planning and Environment (DPE) approved the rezoning, subject to conditions. Condition 1(ii) was:

Include an air quality impact assessments [*sic*], with detailed consideration given to locating residential development in close proximity to the adjacent classified roads. Subject to the findings of these investigations a human health impact assessment may also be required, with specific consideration given to sensitivities associated with vehicle emissions.

EMM Consulting Pty Limited (EMM) was commissioned to conduct a screening air quality impact assessment to assess the potential impact on the project of emissions from traffic on nearby roads. This report presents the assessment method and the findings.

2 Project overview

The project site is located at 60 Wyong Road and 68 Tonkiss Street, Tuggerah and is legally described as:

- Lot 2 / DP1056960; and
- Lot 3 / DP1084221.

The project site is located on the southern side of Wyong Road, between Tuggerah Westfield and the M1 Pacific Motorway, as shown Figure 2.1. The project site has an area of approximately 41.6 hectares, and is currently unoccupied. The project site is currently zoned as 'RU6 Transition', 'MU1 Mixed Use' and 'C2 Environmental Conservation'.

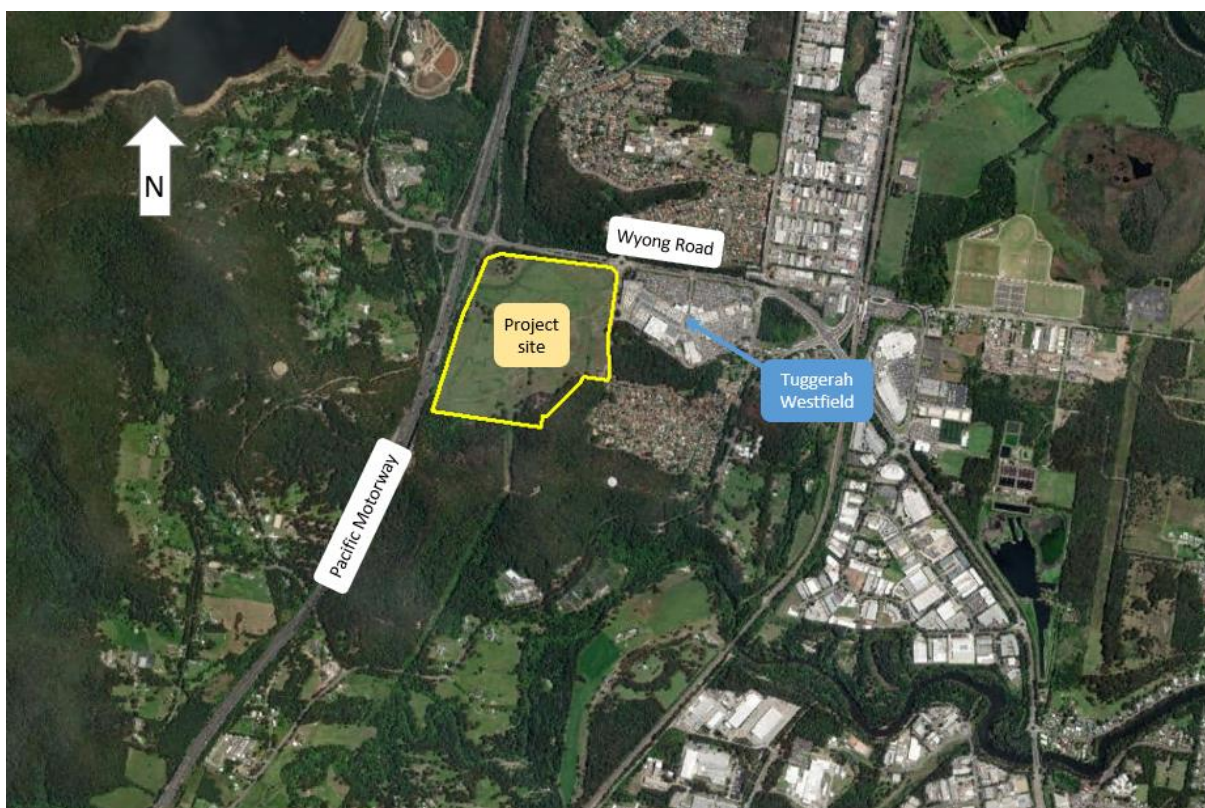


Figure 2.1 Project site location

The proposed amendments to the Local Environmental Plan at the project site will enable residential, mixed-use and recreational land uses, as shown in the structure plan in Figure 2.2. The proposal seeks to rezone land from 'RU6 Transition' to 'R1 General Residential'. The 'MU1 Mixed Use' zone in the north-east of the project site, and the 'C2 Environmental Conservation' zone in the south-east are to be retained (Ason Group, 2021).

In the long term, the project site will be capable of accommodating 2,112 dwellings, including a mix of detached housing lots, medium density townhouses/terraces, apartments and seniors living. Consistent with the structure plan, the future development of the project site is to be staged in accordance with market demand and infrastructure requirements. In the short term, employment uses in the form of bulky goods and large-format retailing will be prioritised in part of the B4 Mixed Use zone. In the longer term, this area is envisaged as a mixed-use precinct (Ason Group, 2021).



Figure 2.2 Structure plan

3 Assessment method

3.1 Overview

The NSW Environment Protection Authority (EPA)'s *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (NSW EPA 2022), referred to hereafter as the Approved Methods for Modelling, sets out the approaches and criteria to be used to assess the air quality impacts of (or on) developments. The Approved Methods for Modelling document is designed mainly for the assessment of industrial point sources, and does not contain specific information on the assessment of transport schemes or land use changes near roads.

However, the Approved Methods for Modelling document does define a general approach to assessment which is applicable, in principle, to air quality assessments relating to road traffic. This general approach involves two levels of assessment:

- Level 1 – a screening-level dispersion modelling exercise using worst-case input data; and
- Level 2 – a refined dispersion modelling exercise using site-specific input data.

The Approved Methods for Modelling states:

The impact assessment levels are designed so that the impact estimates from the second level should be more accurate than the first. This means that, for a given facility, the result of a Level 1 impact assessment would be more conservative and less specific than the result of a Level 2 assessment. It is not intended that an assessment should routinely progress through the two levels. If air quality impact is considered to be a significant issue, there is no impediment to immediately conducting a Level 2 assessment. Equally, if a Level 1 assessment conclusively demonstrates that adverse impacts will not occur, there is no need to progress to Level 2.

For this assessment, a Level 1 (screening) assessment was conducted using the Tool for Roadside Air Quality (TRAQ)¹ developed by NSW Roads and Maritime Services.

3.2 TRAQ

TRAQ is designed as a screening tool for road projects when preparing an air quality impact assessment. It can also be used to determine the impacts of existing traffic on air quality at new developments near roads. TRAQ is not designed to provide accurate air quality predictions; it uses conservative assumptions and data to determine whether a more detailed assessment is required. TRAQ is applicable to simple applications, and should generally provide conservative results. It is not considered to be suitable for complex situations such as roads through urban canyons, major intersections or tunnels.

The pollutants included in TRAQ are carbon monoxide (CO), nitrogen dioxide (NO₂) and particulate matter with an aerodynamic diameter of less than 10 µm (PM₁₀). Emissions and concentrations of oxides of nitrogen (NO_x) are also calculated in order to determine NO₂. The conversion of NO_x to NO₂ takes into account the distance from the road. The relevant averaging periods for air quality standards are also considered. These are:

- for CO, maximum 1-hour and maximum 8-hour concentrations;
- for NO₂, annual mean and maximum 1-hour concentrations; and
- for PM₁₀, annual mean and maximum 24-hour concentrations.

¹ <https://www.rms.nsw.gov.au/about/environment/air/traq/index.html>

TRAQ incorporates vehicle emission factors from NSW EPA, as developed for the 2012 emissions inventory for the NSW Greater Metropolitan Region (GMR). The emission factors only cover vehicles running on fossil fuel; alternatives such as biodiesel, hybrids, plug-in hybrids, battery electric technology and hydrogen fuel cell technology are not taken into account. This is likely to introduce a substantial element of conservatism into the TRAQ predictions, especially for any assessment years well into the future. TRAQ also contains default traffic composition data for NSW, although the values can be replaced by more appropriate data if needed.

Pollutant dispersion is simulated using the CALINE 4 model. TRAQ predicts the concentrations on either side of the road, and at various fixed distances from the kerb (0 m, 10 m, 20 m, 30 m, 40 m, 50 m, 75 m, 100 m, 150 m and 200 m). When simulating dispersion using CALINE 4, TRAQ calculates maximum short-term concentrations based on the 'worst case wind angle'. In addition, other CALINE 4 parameters are configured to simulate poor dispersion conditions, and hence relatively high concentrations. For example, the wind speed is set at a low value (1 m/s) and atmospheric stability is defined as 'F class' (stable night-time conditions).

TRAQ also incorporates generic background air quality statistics (i.e. for locations away from roads), based on measurements from NSW DPE monitoring stations. Again, the values can be replaced by more appropriate data if needed.

TRAQ is only capable of simulating one road at a time. The results of TRAQ are presented in terms of the contribution from the traffic on the road, the estimated background concentration and the cumulative concentration (traffic contribution plus background) for comparison against NSW EPA air quality assessment criteria.

3.3 Assessment locations

As noted above, TRAQ predicts concentrations at various fixed distances from the kerb.

For this assessment, four roads were considered to be relevant in terms of potential air quality impacts within the project site boundary:

- Pacific Motorway (mainline);
- Pacific Motorway (on-ramp);
- Wyong Road; and
- Tonkiss Street.

These roads were assessed individually using TRAQ. The zones within the project site that were closest to the roads were identified (see Figure 3.1), and for each zone the shortest distance from the kerb to a potential building façade was estimated using a geographic information system (GIS) (see Table 3.1). The results from TRAQ were then selected for the corresponding distances.

At some locations at the project site, more than one road would contribute to the concentration. Such potential 'combined effects' were taken into account in the following cases, and using a 'worst case' approach:

- for zones TR17, TR18 and TR19, the road contributions from the mainline of the Pacific Motorway and the adjoining on-ramp were added; and
- for zones MU1-A, the road contributions from Wyong Road and Tonkiss Road were added.

For each zone the combined road concentration was then added to the background concentration, and the cumulative result was compared with the air quality criterion.



Figure 3.1 Zone closest to surrounding roads

Table 3.1 Minimum distances from kerb to building

Project site boundary	Road	Zone	Description	Distance from kerb to building (m) (approx.)
West	Pacific Motorway (mainline)	TR17	Terrace homes	55
		TR18		55
		TR19		51
	Pacific Motorway (on-ramp)	TR17	32	
		TR18	32	
		TR19	44	
North	Wyong Road	MU2-D	Retail bulky goods (up to 2 retail storeys) / future mixed use (up to 12 storeys)	65
		MU2-B		63
		MU1-C		56
		MU1-A		54
East	Tonkiss Street	MU1-A	As above	9
		HR1	Medium-rise apartments (up to 6 storeys)	8
		MR3	Low/medium-rise apartments (up to 6 storeys)	12
		TH4	Town house/duplex	0 (at kerb)
		DL1	Detached homes (large)	0 (at kerb)

3.4 Air quality criteria

The NSW EPA air quality assessment criteria, applicable to outdoor environments, are presented in Table 3.2. Typically, for sensitive uses such as residences, the occupants are indoors for most of the day, and their exposure to traffic pollution would tend to be lower than in an outdoor situation. In the air quality assessment, it was effectively assumed that occupants would be active in outdoor areas of residences throughout the day, and this represented a worst-case scenario in terms of their potential exposure to traffic pollution.

Table 3.2 Air quality assessment criteria (NSW EPA, 2022)

Pollutant	Averaging period	Criterion ^(a)
CO	1 hour	30 mg/m ³
	8 hours	10 mg/m ³
NO ₂	1 hour	164 µg/m ³
	Annual	31 µg/m ³
PM ₁₀	24 hours	50 µg/m ³
	Annual	25 µg/m ³

(a) The criteria stated in TRAQ for 1-hour and annual NO₂ are 246 µg/m³ and 62 µg/m³, respectively. These have now been superseded by the values in the table.

3.5 Scenarios

Two scenario years were assessed to take into account potential future growth in traffic and changes in composition:

- an estimated project opening year (2026, the earliest future year in TRAQ); and
- ten years after project opening (2036).

3.6 Traffic data

Base year traffic data for the assessment were taken from the following sources:

- the traffic assessment for the project site was undertaken by Ason Group (2021); and
- the Transport for NSW Traffic Volume Viewer for the Mount White traffic monitoring site².

The available traffic data are summarised in Table 3.4.

The base year of the data was either 2021 or 2022³. These were scaled for 2026 and 2036 using traffic growth rates of 2% per annum (Pacific Motorway mainline) and 1.4% per annum (all other roads) (Ason Group 2021).

The traffic volume on the Pacific Motorway on-ramp was estimated to be 50% of the traffic on Wyong Road. Given the uncertainty in this estimate, a sensitivity test was also conducted, with the traffic on the on-ramp taken to be 100% of the traffic on Wyong Road.

² <https://roads-waterways.transport.nsw.gov.au/about/corporate-publications/statistics/traffic-volumes/aadt-map/index.html#/?z=11&lat=-33.367142036686595&lon=151.38290929723166&id=T0479-PR>

³ The base year for the data from the Traffic Volume Viewer was taken to be 2022 to minimise the impact of COVID-19.

Table 3.3 Available traffic data

Parameter	Value	Reference
Pacific Highway (mainline)		
Road type	Classified - Highway	Ason Group (2021)
Speed limit (km/h)	110	Ason Group (2021)
AADT (2-way)	70,254 (2022 base year)	TfNSW (2023)
	76,045 (2026)	Assumption based on traffic growth
	92,699 (2036)	Assumption based on traffic growth
%HDV	9	TfNSW (2023)
Pacific Highway (on-ramp)		
Road type	Classified - Highway	Assumption (as mainline motorway)
Speed limit (km/h)	110	Assumption (as mainline motorway)
AADT (2-way)	15,000 (2021 base year)	Assumption (50% of Wyong Road traffic)
	16,080 (2026)	Assumption based on traffic growth
	18,478 (2036)	Assumption based on traffic growth
%HDV	3	Assumption (as Wyong Road)
Wyong Road		
Road type	Classified - Arterial	Ason Group (2021)
Speed limit (km/h)	70	Ason Group (2021)
AADT (2-way)	30,000 (2021 base year)	Ason Group (2021)
	32,160 (2026)	Assumption based on traffic growth
	36,956 (2036)	Assumption based on traffic growth
%HDV	3	Ason Group (2021)
Tonkiss Street		
Road type	Local/collector	Ason Group (2021)
Speed limit (km/h)	50	Ason Group (2021)
AADT (2-way)	4,000 (2021 base year)	Ason Group (2021)
	4,288 (2026)	Assumption based on traffic growth
	4,928 (2036)	Assumption based on traffic growth
%HDV	1	Ason Group (2021)

3.7 TRAQ inputs and settings

The general inputs for TRAQ are summarised in Table 3.4. For background air quality, the default data in TRAQ were replaced with values from the DPE monitoring station at Wyong in 2022 (see Appendix A).

Table 3.4 General inputs

Parameter	Input
Modelled years	2026 and 2036
Local land use	Rural
Air quality environment ^(a)	Wyong (DPE monitoring station) ^(b)
Season	Worst-case ^(c)
Cold-start emissions	Included

(a) This defines the background concentrations for the assessment.

(b) The monitoring station was approximately 3.8 km to the north-east of the project site. The concentrations at Wyong in 2022 were used in the assessment.

(c) By selecting 'worst case', TRAQ uses the highest emission factor of any season for a given pollutant and vehicle type.

The road traffic inputs for TRAQ are summarised in Table 3.5. For each road the total 2-way AADT was split equally across all lanes. The assumed traffic compositions are summarised Table 3.6. These were based on the projections from the GMR inventory, taking into account the correct proportion of heavy vehicles on each road.

Table 3.5 Road traffic inputs

Parameter	Input by road			
	Pacific Motorway (mainline)	Pacific Motorway (on-ramp)	Wyong Road	Tonkiss Street
Road type ^(a)	Highway/freeway	Highway/freeway	Arterial	Arterial
Number of lanes	6 (3 NB and 3 SB)	1 (SB)	4 (2 EB and 2 WB)	4 (2 NB and 2 SB)
Median strip	Yes (14.5 m)	No	Yes (3 m)	Yes (4 m)
Road gradient (%) ^(b)	-4% (NB); +4% (SB)	+4% (SB)	-4% (EB); +4% (WB)	-8% (NB); +8% (SB)
AADT (vpd/lane) (2026)	12,674 ^(c)	16,080 ^(d)	8,040 ^(d)	1,072 ^(d)
AADT (vpd/lane) (2036)	15,450 ^(c)	18,478 ^(d)	9,239 ^(d)	1,232 ^(d)
Peak hour traffic as % of daily traffic (%)	7.5	11	11	30
Peak hour traffic speed (km/h)	110	110	70	50

(a) Categories in emission model in TRAQ. Settings assumed based on the traffic assessment by Ason Group (2021).

(b) Based on elevation data from Google Earth.

(c) Projection from 2022 based on 2% growth per annum.

(d) Projection from 2022 based on 1.4% growth per annum.

Table 3.6 Traffic mix in 2026 and 2036

Vehicle type	Pacific Motorway (mainline)		Pacific Motorway (on-ramp) ^(a)		Wyong Road		Tonkiss Street	
	Highway/ freeway		Highway/ freeway		Arterial		Arterial	
	2026 (%)	2036 (%)	2026 (%)	2036 (%)	2026 (%)	2036 (%)	2026 (%)	2036 (%)
Petrol car	53.6	43.5	58.7	47.7	58.7	47.7	59.9	48.7
Diesel car	18.2	27.8	19.8	30.5	19.8	30.5	20.2	31.2
Petrol light-duty commercial	2.9	0.8	2.8	0.8	2.8	0.8	2.9	0.8
Diesel light-duty commercial	15.8	18.4	15.2	17.5	15.2	17.5	15.5	17.8
Petrol heavy-duty vehicle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rigid truck	5.7	5.7	2.1	2.1	2.1	2.1	0.7	0.7
Articulated truck	3.2	3.2	0.6	0.6	0.6	0.6	0.2	0.2
Diesel bus	0.1	0.1	0.3	0.3	0.3	0.3	0.1	0.1
Motorcycle	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(a) Traffic mix assumed to be same as Wyong Road.

4 Results

4.1 Individual roads

The concentrations predicted by TRAQ for the four individual roads in 2026 and 2036 are given in Appendix A. The cumulative concentrations for the relevant distances in the TRAQ output are summarised in Table 4.1 and Table 4.2. For each pollutant metric, the concentration as a percentage of the corresponding criterion is also shown.

The predicted cumulative concentrations were well below the respective air quality criteria at all distances from the kerb of each road and in both assessment years. When expressed as a percentage of a criterion, the highest results were for PM₁₀ (up to around 60%). However, this was mainly due to the relatively high background concentration for PM₁₀ compared with the other pollutants.

In the sensitivity test for the Pacific Motorway on-ramp, in which the traffic on the on-ramp taken to be 100% of the traffic on Wyong Road, the predicted concentrations (not shown) remained well below the respective air quality criteria.

Table 4.1 Summary of TRAQ results for individual roads (2026)

Zone	Distance from kerb to building (m)	Distance in TRAQ (m)	Predicted cumulative concentration (% of criterion in brackets)					
			Max. 1-hour CO (mg/m ³)	Max. 8-hour CO (mg/m ³)	Max. 1-hour NO ₂ (µg/m ³)	Annual NO ₂ (µg/m ³)	Max. 24-hour PM ₁₀ (µg/m ³)	Annual PM ₁₀ (µg/m ³)
Pacific Motorway (mainline)								
TR17	55	50	1.9 (6%)	1.3 (13%)	39.8 (24%)	9.2 (30%)	23.2 (46%)	14.0 (56%)
TR18	55							
TR19	51							
Pacific Motorway (on-ramp)								
TR17	32	30	1.3 (4%)	0.9 (9%)	26.3 (16%)	6.5 (21%)	19.7 (39%)	12.6 (50%)
TR18	32							
TR19	44	40	1.1 (4%)	0.8 (8%)	24.6 (15%)	6.1 (20%)	19.3 (39%)	12.5 (50%)
Wyong Road								
MU2-D	65	50	0.2 (1%)	0.2 (2%)	24.1 (15%)	6.0 (19%)	21.5 (43%)	13.3 (52%)
MU2-B	63							
MU1-C	56							
MU1-A	54							
Tonkiss Street								
MU1-A	9	0/10	0.2/0.1 (1%/0%)	0.1/0.1 (1%/1%)	25.2/21.2 (15%/13%)	6.3/5.5 (20%/18%)	24.6/20.9 (49%/42%)	14.6/13.1 (58%/52%)
HR1	8							
MR3	12							
TH4	N/A	0	0.2 (1%)	0.1 (1%)	25.2 (19%)	6.3 (20%)	24.6 (49%)	14.6 (58%)
DL1	N/A							
Air quality criterion			30	10	164	31	50	25

Table 4.2 Summary of TRAQ results for individual roads (2036)

Zone	Distance from kerb to building (m)	Distance in TRAQ (m)	Predicted cumulative concentration (% of criterion in brackets)					
			Max. 1-hour CO (mg/m ³)	Max. 8-hour CO (mg/m ³)	Max. 1-hour NO ₂ (µg/m ³)	Annual NO ₂ (µg/m ³)	Max. 24-hour PM ₁₀ (µg/m ³)	Annual PM ₁₀ (µg/m ³)
Pacific Motorway (mainline)								
TR17	55	50	1.8 (6%)	1.2 (12%)	39.0 (24%)	9.0 (29%)	23.8 (48%)	14.3 (57%)
TR18	55							
TR19	51							
Pacific Motorway (on-ramp)								
TR17	32	30	1.2 (4%)	0.8 (8%)	24.9 (15%)	6.2 (20%)	19.7 (39%)	12.6 (50%)
TR18	32							
TR19	44	40	1.0 (3%)	0.7 (7%)	23.4 (14%)	5.9 (19%)	19.3 (39%)	12.5 (50%)
Wyong Road								
MU2-D	65	50	0.2 (1%)	0.1 (1%)	23.4 (14%)	5.9 (19%)	21.9 (44%)	13.5 (54%)
MU2-B	63							
MU1-C	56							
MU1-A	54							
Tonkiss Street								
MU1-A	9	0/10	0.1/0.1 (0%/0%)	0.1/0 (1%/0%)	24.4/20.6 (15%/13%)	6.1/5.3 (20%/17%)	25.1/21.1 (50%/43%)	14.8/13.2 (59%/53%)
HR1	8							
MR3	12							
TH4	N/A	0	0.1 (0%)	0.1 (1%)	24.4 (15%)	6.1 (20%)	25.1 (50%)	14.8 (59%)
DL1	N/A							
Air quality criterion			30	10	164	31	50	25

4.2 Combined effects of different roads

The results for the locations where the combined effects of different roads were determined are summarised in Table 4.3. Again, the predicted cumulative concentrations were well below the respective air quality criteria at all distances from the kerb and in both assessment years.

Table 4.3 Summary of TRAQ results for combined roads

Zone	Distances in TRAQ (m)	Predicted cumulative concentration (% of criterion in brackets)					
		Max. 1-hour CO (mg/m ³)	Max. 8-hour CO (mg/m ³)	Max. 1-hour NO ₂ (µg/m ³)	Annual NO ₂ (µg/m ³)	Max. 24-hour PM ₁₀ (µg/m ³)	Annual PM ₁₀ (µg/m ³)
2026							
TR17	50 m from Pacific Motorway mainline, 30 m from on-ramp	3.2 (11%)	2.2 (22%)	51.7 (32%)	11.6 (37%)	25.5 (51%)	14.9 (60%)
TR18	50 m from Pacific Motorway mainline, 30 m from on-ramp						
TR19	50 m from Pacific Motorway mainline, 40 m from on-ramp	3.0 (10%)	2.1 (21%)	50.0 (30%)	11.2 (36%)	25.1 (50%)	14.8 (59%)
MU1-A	50 m from Wyong Road, 10 m from Tonkiss street	0.3 (1%)	0.3 (3%)	30.9 (19%)	7.4 (24%)	25.0 (50%)	14.7 (59%)
2036							
TR17	50 m from Pacific Motorway mainline, 30 m from on-ramp	3.0 (10%)	2.0 (20%)	49.5 (30%)	11.1 (36%)	26.1 (52%)	15.2 (61%)
TR18	50 m from Pacific Motorway mainline, 30 m from on-ramp						
TR19	50 m from Pacific Motorway mainline, 40 m from on-ramp	2.8 (9%)	1.9 (19%)	48.0 (29%)	10.8 (35%)	25.7 (51%)	15.1 (60%)
MU1-A	50 m from Wyong Road, 10 m from Tonkiss street	0.3 (1%)	0.1 (1%)	29.6 (18%)	7.1 (23%)	25.6 (51%)	15.0 (60%)
Air quality criterion		30	10	164	31	50	25

5 Conclusions

Given the multiple conservative assumptions and inputs used in TRAQ, it is considered that air quality will not represent a significant constraint to the development of the project site, and a more detailed (Level 2) air quality assessment for the project site is not required.

6 References

Ason Group 2021, Tuggerah Gateway Precinct Rezoning, Pre-Gateway - Transport Assessment, Report P1663, September 2021, Ason Group, Sydney.

NSW EPA 2022, Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, NSW Environment Protection Authority, Sydney.

TfNSW 2023, Transport for NSW Traffic Volume Viewer, M1 Pacific Motorway, Mount White (Station: T0479-PR).

<https://roads-waterways.transport.nsw.gov.au/about/corporate-publications/statistics/traffic-volumes/aadt-map/index.html#/?z=14&lat=-33.45388199049947&lon=151.10500472502008&id=T0479-PR&df=0&tb=1>

Appendix A

TRAQ results

A.1 TRAQ results for 2026

Table A.1 Predicted concentrations: Pacific Motorway (mainline)

PREDICTED ROADSIDE CONCENTRATIONS AND ASSESSMENT					
Maximum 1-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	8.9	0.0	8.9	30	Compliance
10 m from kerb	3.9	0.0	3.9	30	Compliance
20 m from kerb	2.9	0.0	2.9	30	Compliance
30 m from kerb	2.4	0.0	2.4	30	Compliance
40 m from kerb	2.1	0.0	2.1	30	Compliance
50 m from kerb	1.9	0.0	1.9	30	Compliance
75 m from kerb	1.5	0.0	1.5	30	Compliance
100 m from kerb	1.3	0.0	1.3	30	Compliance
150 m from kerb	1	0.0	1.0	30	Compliance
200 m from kerb	0.9	0.0	0.9	30	Compliance
Maximum 8-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	6.2	0.0	6.2	10	Compliance
10 m from kerb	2.8	0.0	2.8	10	Compliance
20 m from kerb	2	0.0	2.0	10	Compliance
30 m from kerb	1.7	0.0	1.7	10	Compliance
40 m from kerb	1.5	0.0	1.5	10	Compliance
50 m from kerb	1.3	0.0	1.3	10	Compliance
75 m from kerb	1.1	0.0	1.1	10	Compliance
100 m from kerb	0.9	0.0	0.9	10	Compliance
150 m from kerb	0.7	0.0	0.7	10	Compliance
200 m from kerb	0.6	0.0	0.6	10	Compliance
Maximum 1-hour average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	61.5	14.4	75.9	164	Compliance
10 m from kerb	40.3	14.4	54.7	164	Compliance
20 m from kerb	39.2	14.4	53.6	164	Compliance
30 m from kerb	32.6	14.4	47.0	164	Compliance
40 m from kerb	28.3	14.4	42.7	164	Compliance
50 m from kerb	25.4	14.4	39.8	164	Compliance
75 m from kerb	20.6	14.4	35.0	164	Compliance
100 m from kerb	17.7	14.4	32.1	164	Compliance
150 m from kerb	13.9	14.4	28.3	164	Compliance
200 m from kerb	11.5	14.4	25.9	164	Compliance
Annual average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	12.3	4.1	16.4	31	Compliance
10 m from kerb	8.1	4.1	12.2	31	Compliance
20 m from kerb	7.8	4.1	11.9	31	Compliance
30 m from kerb	6.5	4.1	10.6	31	Compliance
40 m from kerb	5.7	4.1	9.8	31	Compliance
50 m from kerb	5.1	4.1	9.2	31	Compliance
75 m from kerb	4.1	4.1	8.2	31	Compliance
100 m from kerb	3.5	4.1	7.6	31	Compliance
150 m from kerb	2.8	4.1	6.9	31	Compliance
200 m from kerb	2.3	4.1	6.4	31	Compliance
Maximum 24-hour average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	22.6	17.4	40.0	50	Compliance
10 m from kerb	11.2	17.4	28.6	50	Compliance
20 m from kerb	8.6	17.4	26.0	50	Compliance
30 m from kerb	7.3	17.4	24.7	50	Compliance
40 m from kerb	6.4	17.4	23.8	50	Compliance
50 m from kerb	5.8	17.4	23.2	50	Compliance
75 m from kerb	4.8	17.4	22.2	50	Compliance
100 m from kerb	4.1	17.4	21.5	50	Compliance
150 m from kerb	3.3	17.4	20.7	50	Compliance
200 m from kerb	2.8	17.4	20.2	50	Compliance
Annual average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	9.1	11.7	20.8	25	Compliance
10 m from kerb	4.5	11.7	16.2	25	Compliance
20 m from kerb	3.4	11.7	15.1	25	Compliance
30 m from kerb	2.9	11.7	14.6	25	Compliance
40 m from kerb	2.6	11.7	14.3	25	Compliance
50 m from kerb	2.3	11.7	14.0	25	Compliance
75 m from kerb	1.9	11.7	13.6	25	Compliance
100 m from kerb	1.7	11.7	13.4	25	Compliance
150 m from kerb	1.3	11.7	13.0	25	Compliance
200 m from kerb	1.1	11.7	12.8	25	Compliance

Table A.2 Predicted concentrations: Pacific Motorway (on-ramp)

PREDICTED ROADSIDE CONCENTRATIONS AND ASSESSMENT					
Maximum 1-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	7.5	0.0	7.5	30	Compliance
10 m from kerb	2.5	0.0	2.5	30	Compliance
20 m from kerb	1.6	0.0	1.6	30	Compliance
30 m from kerb	1.3	0.0	1.3	30	Compliance
40 m from kerb	1.1	0.0	1.1	30	Compliance
50 m from kerb	1	0.0	1.0	30	Compliance
75 m from kerb	0.8	0.0	0.8	30	Compliance
100 m from kerb	0.7	0.0	0.7	30	Compliance
150 m from kerb	0.6	0.0	0.6	30	Compliance
200 m from kerb	0.5	0.0	0.5	30	Compliance
Maximum 8-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	5.2	0.0	5.2	10	Compliance
10 m from kerb	1.7	0.0	1.7	10	Compliance
20 m from kerb	1.2	0.0	1.2	10	Compliance
30 m from kerb	0.9	0.0	0.9	10	Compliance
40 m from kerb	0.8	0.0	0.8	10	Compliance
50 m from kerb	0.7	0.0	0.7	10	Compliance
75 m from kerb	0.6	0.0	0.6	10	Compliance
100 m from kerb	0.5	0.0	0.5	10	Compliance
150 m from kerb	0.4	0.0	0.4	10	Compliance
200 m from kerb	0.3	0.0	0.3	10	Compliance
Maximum 1-hour average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	34.1	14.4	48.5	164	Compliance
10 m from kerb	17.1	14.4	31.5	164	Compliance
20 m from kerb	15	14.4	29.4	164	Compliance
30 m from kerb	11.9	14.4	26.3	164	Compliance
40 m from kerb	10.2	14.4	24.6	164	Compliance
50 m from kerb	9.1	14.4	23.5	164	Compliance
75 m from kerb	7.3	14.4	21.7	164	Compliance
100 m from kerb	6.3	14.4	20.7	164	Compliance
150 m from kerb	5.1	14.4	19.5	164	Compliance
200 m from kerb	4.3	14.4	18.7	164	Compliance
Annual average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	6.8	4.1	10.9	31	Compliance
10 m from kerb	3.4	4.1	7.5	31	Compliance
20 m from kerb	3	4.1	7.1	31	Compliance
30 m from kerb	2.4	4.1	6.5	31	Compliance
40 m from kerb	2	4.1	6.1	31	Compliance
50 m from kerb	1.8	4.1	5.9	31	Compliance
75 m from kerb	1.5	4.1	5.6	31	Compliance
100 m from kerb	1.3	4.1	5.4	31	Compliance
150 m from kerb	1	4.1	5.1	31	Compliance
200 m from kerb	0.9	4.1	5.0	31	Compliance
Maximum 24-hour average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	13	17.4	30.4	50	Compliance
10 m from kerb	4.3	17.4	21.7	50	Compliance
20 m from kerb	2.8	17.4	20.2	50	Compliance
30 m from kerb	2.3	17.4	19.7	50	Compliance
40 m from kerb	1.9	17.4	19.3	50	Compliance
50 m from kerb	1.7	17.4	19.1	50	Compliance
75 m from kerb	1.4	17.4	18.8	50	Compliance
100 m from kerb	1.2	17.4	18.6	50	Compliance
150 m from kerb	1	17.4	18.4	50	Compliance
200 m from kerb	0.8	17.4	18.2	50	Compliance
Annual average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	5.2	11.7	16.9	25	Compliance
10 m from kerb	1.7	11.7	13.4	25	Compliance
20 m from kerb	1.1	11.7	12.8	25	Compliance
30 m from kerb	0.9	11.7	12.6	25	Compliance
40 m from kerb	0.8	11.7	12.5	25	Compliance
50 m from kerb	0.7	11.7	12.4	25	Compliance
75 m from kerb	0.6	11.7	12.3	25	Compliance
100 m from kerb	0.5	11.7	12.2	25	Compliance
150 m from kerb	0.4	11.7	12.1	25	Compliance
200 m from kerb	0.3	11.7	12.0	25	Compliance

Table A.3 Predicted concentrations: Wyong Road

PREDICTED ROADSIDE CONCENTRATIONS AND ASSESSMENT

Maximum 1-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	1.2	0.0	1.2	30	Compliance
10 m from kerb	0.5	0.0	0.5	30	Compliance
20 m from kerb	0.4	0.0	0.4	30	Compliance
30 m from kerb	0.3	0.0	0.3	30	Compliance
40 m from kerb	0.3	0.0	0.3	30	Compliance
50 m from kerb	0.2	0.0	0.2	30	Compliance
75 m from kerb	0.2	0.0	0.2	30	Compliance
100 m from kerb	0.2	0.0	0.2	30	Compliance
150 m from kerb	0.1	0.0	0.1	30	Compliance
200 m from kerb	0.1	0.0	0.1	30	Compliance
Maximum 8-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	0.9	0.0	0.9	10	Compliance
10 m from kerb	0.4	0.0	0.4	10	Compliance
20 m from kerb	0.3	0.0	0.3	10	Compliance
30 m from kerb	0.2	0.0	0.2	10	Compliance
40 m from kerb	0.2	0.0	0.2	10	Compliance
50 m from kerb	0.2	0.0	0.2	10	Compliance
75 m from kerb	0.1	0.0	0.1	10	Compliance
100 m from kerb	0.1	0.0	0.1	10	Compliance
150 m from kerb	0.1	0.0	0.1	10	Compliance
200 m from kerb	0.1	0.0	0.1	10	Compliance
Maximum 1-hour average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	27.4	14.4	41.8	164	Compliance
10 m from kerb	16.2	14.4	30.6	164	Compliance
20 m from kerb	15.3	14.4	29.7	164	Compliance
30 m from kerb	12.6	14.4	27.0	164	Compliance
40 m from kerb	10.9	14.4	25.3	164	Compliance
50 m from kerb	9.7	14.4	24.1	164	Compliance
75 m from kerb	7.8	14.4	22.2	164	Compliance
100 m from kerb	6.7	14.4	21.1	164	Compliance
150 m from kerb	5.2	14.4	19.6	164	Compliance
200 m from kerb	4.4	14.4	18.8	164	Compliance
Annual average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	5.5	4.1	9.6	31	Compliance
10 m from kerb	3.2	4.1	7.3	31	Compliance
20 m from kerb	3.1	4.1	7.2	31	Compliance
30 m from kerb	2.5	4.1	6.6	31	Compliance
40 m from kerb	2.2	4.1	6.3	31	Compliance
50 m from kerb	1.9	4.1	6.0	31	Compliance
75 m from kerb	1.6	4.1	5.7	31	Compliance
100 m from kerb	1.3	4.1	5.4	31	Compliance
150 m from kerb	1	4.1	5.1	31	Compliance
200 m from kerb	0.9	4.1	5.0	31	Compliance
Maximum 24-hour average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	18.2	17.4	35.6	50	Compliance
10 m from kerb	8.4	17.4	25.8	50	Compliance
20 m from kerb	6.3	17.4	23.7	50	Compliance
30 m from kerb	5.3	17.4	22.7	50	Compliance
40 m from kerb	4.6	17.4	22.0	50	Compliance
50 m from kerb	4.1	17.4	21.5	50	Compliance
75 m from kerb	3.4	17.4	20.8	50	Compliance
100 m from kerb	2.9	17.4	20.3	50	Compliance
150 m from kerb	2.3	17.4	19.7	50	Compliance
200 m from kerb	1.9	17.4	19.3	50	Compliance
Annual average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	7.3	11.7	19.0	25	Compliance
10 m from kerb	3.4	11.7	15.1	25	Compliance
20 m from kerb	2.5	11.7	14.2	25	Compliance
30 m from kerb	2.1	11.7	13.8	25	Compliance
40 m from kerb	1.8	11.7	13.5	25	Compliance
50 m from kerb	1.6	11.7	13.3	25	Compliance
75 m from kerb	1.3	11.7	13.0	25	Compliance
100 m from kerb	1.1	11.7	12.8	25	Compliance
150 m from kerb	0.9	11.7	12.6	25	Compliance
200 m from kerb	0.8	11.7	12.5	25	Compliance

Table A.4 Predicted concentrations: Tonkiss Street

PREDICTED ROADSIDE CONCENTRATIONS AND ASSESSMENT

Maximum 1-hour average CO concentrations (mg/m3)

Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	0.2	0.0	0.2	30	Compliance
10 m from kerb	0.1	0.0	0.1	30	Compliance
20 m from kerb	0.1	0.0	0.1	30	Compliance
30 m from kerb	0	0.0	0.0	30	Compliance
40 m from kerb	0	0.0	0.0	30	Compliance
50 m from kerb	0	0.0	0.0	30	Compliance
75 m from kerb	0	0.0	0.0	30	Compliance
100 m from kerb	0	0.0	0.0	30	Compliance
150 m from kerb	0	0.0	0.0	30	Compliance
200 m from kerb	0	0.0	0.0	30	Compliance

Maximum 8-hour average CO concentrations (mg/m3)

Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	0.1	0.0	0.1	10	Compliance
10 m from kerb	0.1	0.0	0.1	10	Compliance
20 m from kerb	0	0.0	0.0	10	Compliance
30 m from kerb	0	0.0	0.0	10	Compliance
40 m from kerb	0	0.0	0.0	10	Compliance
50 m from kerb	0	0.0	0.0	10	Compliance
75 m from kerb	0	0.0	0.0	10	Compliance
100 m from kerb	0	0.0	0.0	10	Compliance
150 m from kerb	0	0.0	0.0	10	Compliance
200 m from kerb	0	0.0	0.0	10	Compliance

Maximum 1-hour average NO2 concentrations (ug/m3)

Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	10.8	14.4	25.2	164	Compliance
10 m from kerb	6.8	14.4	21.2	164	Compliance
20 m from kerb	6.5	14.4	20.9	164	Compliance
30 m from kerb	5.4	14.4	19.8	164	Compliance
40 m from kerb	4.6	14.4	19.0	164	Compliance
50 m from kerb	4.1	14.4	18.5	164	Compliance
75 m from kerb	3.3	14.4	17.7	164	Compliance
100 m from kerb	2.8	14.4	17.2	164	Compliance
150 m from kerb	2.2	14.4	16.6	164	Compliance
200 m from kerb	1.8	14.4	16.2	164	Compliance

Annual average NO2 concentrations (ug/m3)

Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	2.2	4.1	6.3	31	Compliance
10 m from kerb	1.4	4.1	5.5	31	Compliance
20 m from kerb	1.3	4.1	5.4	31	Compliance
30 m from kerb	1.1	4.1	5.2	31	Compliance
40 m from kerb	0.9	4.1	5.0	31	Compliance
50 m from kerb	0.8	4.1	4.9	31	Compliance
75 m from kerb	0.7	4.1	4.8	31	Compliance
100 m from kerb	0.6	4.1	4.7	31	Compliance
150 m from kerb	0.4	4.1	4.5	31	Compliance
200 m from kerb	0.4	4.1	4.5	31	Compliance

Maximum 24-hour average PM10 concentrations (ug/m3)

Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	7.2	17.4	24.6	50	Compliance
10 m from kerb	3.5	17.4	20.9	50	Compliance
20 m from kerb	2.6	17.4	20.0	50	Compliance
30 m from kerb	2.2	17.4	19.6	50	Compliance
40 m from kerb	1.9	17.4	19.3	50	Compliance
50 m from kerb	1.7	17.4	19.1	50	Compliance
75 m from kerb	1.4	17.4	18.8	50	Compliance
100 m from kerb	1.2	17.4	18.6	50	Compliance
150 m from kerb	0.9	17.4	18.3	50	Compliance
200 m from kerb	0.8	17.4	18.2	50	Compliance

Annual average PM10 concentrations (ug/m3)

Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	2.9	11.7	14.6	25	Compliance
10 m from kerb	1.4	11.7	13.1	25	Compliance
20 m from kerb	1	11.7	12.7	25	Compliance
30 m from kerb	0.9	11.7	12.6	25	Compliance
40 m from kerb	0.8	11.7	12.5	25	Compliance
50 m from kerb	0.7	11.7	12.4	25	Compliance
75 m from kerb	0.6	11.7	12.3	25	Compliance
100 m from kerb	0.5	11.7	12.2	25	Compliance
150 m from kerb	0.4	11.7	12.1	25	Compliance
200 m from kerb	0.3	11.7	12.0	25	Compliance

A.2 TRAQ results for 2036

Table A.5 Predicted concentrations: Pacific Motorway (mainline)

PREDICTED ROADSIDE CONCENTRATIONS AND ASSESSMENT					
Maximum 1-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	8.6	0.0	8.6	30	Compliance
10 m from kerb	3.7	0.0	3.7	30	Compliance
20 m from kerb	2.7	0.0	2.7	30	Compliance
30 m from kerb	2.3	0.0	2.3	30	Compliance
40 m from kerb	2	0.0	2.0	30	Compliance
50 m from kerb	1.8	0.0	1.8	30	Compliance
75 m from kerb	1.5	0.0	1.5	30	Compliance
100 m from kerb	1.2	0.0	1.2	30	Compliance
150 m from kerb	1	0.0	1.0	30	Compliance
200 m from kerb	0.8	0.0	0.8	30	Compliance
Maximum 8-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	6	0.0	6.0	10	Compliance
10 m from kerb	2.6	0.0	2.6	10	Compliance
20 m from kerb	1.9	0.0	1.9	10	Compliance
30 m from kerb	1.6	0.0	1.6	10	Compliance
40 m from kerb	1.4	0.0	1.4	10	Compliance
50 m from kerb	1.2	0.0	1.2	10	Compliance
75 m from kerb	1	0.0	1.0	10	Compliance
100 m from kerb	0.9	0.0	0.9	10	Compliance
150 m from kerb	0.7	0.0	0.7	10	Compliance
200 m from kerb	0.6	0.0	0.6	10	Compliance
Maximum 1-hour average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	60.6	14.4	75.0	164	Compliance
10 m from kerb	39	14.4	53.4	164	Compliance
20 m from kerb	37.7	14.4	52.1	164	Compliance
30 m from kerb	31.3	14.4	45.7	164	Compliance
40 m from kerb	27.3	14.4	41.7	164	Compliance
50 m from kerb	24.6	14.4	39.0	164	Compliance
75 m from kerb	20	14.4	34.4	164	Compliance
100 m from kerb	17.1	14.4	31.5	164	Compliance
150 m from kerb	13.5	14.4	27.9	164	Compliance
200 m from kerb	11.3	14.4	25.7	164	Compliance
Annual average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	12.1	4.1	16.2	31	Compliance
10 m from kerb	7.8	4.1	11.9	31	Compliance
20 m from kerb	7.5	4.1	11.6	31	Compliance
30 m from kerb	6.3	4.1	10.4	31	Compliance
40 m from kerb	5.5	4.1	9.6	31	Compliance
50 m from kerb	4.9	4.1	9.0	31	Compliance
75 m from kerb	4	4.1	8.1	31	Compliance
100 m from kerb	3.4	4.1	7.5	31	Compliance
150 m from kerb	2.7	4.1	6.8	31	Compliance
200 m from kerb	2.3	4.1	6.4	31	Compliance
Maximum 24-hour average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	24.7	17.4	42.1	50	Compliance
10 m from kerb	12.2	17.4	29.6	50	Compliance
20 m from kerb	9.3	17.4	26.7	50	Compliance
30 m from kerb	7.9	17.4	25.3	50	Compliance
40 m from kerb	7	17.4	24.4	50	Compliance
50 m from kerb	6.4	17.4	23.8	50	Compliance
75 m from kerb	5.3	17.4	22.7	50	Compliance
100 m from kerb	4.6	17.4	22.0	50	Compliance
150 m from kerb	3.7	17.4	21.1	50	Compliance
200 m from kerb	3.1	17.4	20.5	50	Compliance
Annual average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	9.9	11.7	21.6	25	Compliance
10 m from kerb	4.9	11.7	16.6	25	Compliance
20 m from kerb	3.7	11.7	15.4	25	Compliance
30 m from kerb	3.2	11.7	14.9	25	Compliance
40 m from kerb	2.8	11.7	14.5	25	Compliance
50 m from kerb	2.6	11.7	14.3	25	Compliance
75 m from kerb	2.1	11.7	13.8	25	Compliance
100 m from kerb	1.8	11.7	13.5	25	Compliance
150 m from kerb	1.5	11.7	13.2	25	Compliance
200 m from kerb	1.2	11.7	12.9	25	Compliance

Table A.6 Predicted concentrations: Pacific Motorway (on-ramp)

PREDICTED ROADSIDE CONCENTRATIONS AND ASSESSMENT					
Maximum 1-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	6.9	0.0	6.9	30	Compliance
10 m from kerb	2.2	0.0	2.2	30	Compliance
20 m from kerb	1.5	0.0	1.5	30	Compliance
30 m from kerb	1.2	0.0	1.2	30	Compliance
40 m from kerb	1	0.0	1.0	30	Compliance
50 m from kerb	0.9	0.0	0.9	30	Compliance
75 m from kerb	0.7	0.0	0.7	30	Compliance
100 m from kerb	0.6	0.0	0.6	30	Compliance
150 m from kerb	0.5	0.0	0.5	30	Compliance
200 m from kerb	0.4	0.0	0.4	30	Compliance
Maximum 8-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	4.8	0.0	4.8	10	Compliance
10 m from kerb	1.6	0.0	1.6	10	Compliance
20 m from kerb	1	0.0	1.0	10	Compliance
30 m from kerb	0.8	0.0	0.8	10	Compliance
40 m from kerb	0.7	0.0	0.7	10	Compliance
50 m from kerb	0.6	0.0	0.6	10	Compliance
75 m from kerb	0.5	0.0	0.5	10	Compliance
100 m from kerb	0.4	0.0	0.4	10	Compliance
150 m from kerb	0.3	0.0	0.3	10	Compliance
200 m from kerb	0.3	0.0	0.3	10	Compliance
Maximum 1-hour average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	31	14.4	45.4	164	Compliance
10 m from kerb	15.2	14.4	29.6	164	Compliance
20 m from kerb	13.2	14.4	27.6	164	Compliance
30 m from kerb	10.5	14.4	24.9	164	Compliance
40 m from kerb	9	14.4	23.4	164	Compliance
50 m from kerb	7.9	14.4	22.3	164	Compliance
75 m from kerb	6.4	14.4	20.8	164	Compliance
100 m from kerb	5.5	14.4	19.9	164	Compliance
150 m from kerb	4.5	14.4	18.9	164	Compliance
200 m from kerb	3.9	14.4	18.3	164	Compliance
Annual average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	6.2	4.1	10.3	31	Compliance
10 m from kerb	3	4.1	7.1	31	Compliance
20 m from kerb	2.6	4.1	6.7	31	Compliance
30 m from kerb	2.1	4.1	6.2	31	Compliance
40 m from kerb	1.8	4.1	5.9	31	Compliance
50 m from kerb	1.6	4.1	5.7	31	Compliance
75 m from kerb	1.3	4.1	5.4	31	Compliance
100 m from kerb	1.1	4.1	5.2	31	Compliance
150 m from kerb	0.9	4.1	5.0	31	Compliance
200 m from kerb	0.8	4.1	4.9	31	Compliance
Maximum 24-hour average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	13.4	17.4	30.8	50	Compliance
10 m from kerb	4.4	17.4	21.8	50	Compliance
20 m from kerb	2.8	17.4	20.2	50	Compliance
30 m from kerb	2.3	17.4	19.7	50	Compliance
40 m from kerb	1.9	17.4	19.3	50	Compliance
50 m from kerb	1.7	17.4	19.1	50	Compliance
75 m from kerb	1.4	17.4	18.8	50	Compliance
100 m from kerb	1.2	17.4	18.6	50	Compliance
150 m from kerb	1	17.4	18.4	50	Compliance
200 m from kerb	0.8	17.4	18.2	50	Compliance
Annual average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	5.3	11.7	17.0	25	Compliance
10 m from kerb	1.7	11.7	13.4	25	Compliance
20 m from kerb	1.1	11.7	12.8	25	Compliance
30 m from kerb	0.9	11.7	12.6	25	Compliance
40 m from kerb	0.8	11.7	12.5	25	Compliance
50 m from kerb	0.7	11.7	12.4	25	Compliance
75 m from kerb	0.6	11.7	12.3	25	Compliance
100 m from kerb	0.5	11.7	12.2	25	Compliance
150 m from kerb	0.4	11.7	12.1	25	Compliance
200 m from kerb	0.3	11.7	12.0	25	Compliance

Table A.7 Predicted concentrations: Wyong Road

PREDICTED ROADSIDE CONCENTRATIONS AND ASSESSMENT

Maximum 1-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	1.1	0.0	1.1	30	Compliance
10 m from kerb	0.4	0.0	0.4	30	Compliance
20 m from kerb	0.3	0.0	0.3	30	Compliance
30 m from kerb	0.3	0.0	0.3	30	Compliance
40 m from kerb	0.2	0.0	0.2	30	Compliance
50 m from kerb	0.2	0.0	0.2	30	Compliance
75 m from kerb	0.2	0.0	0.2	30	Compliance
100 m from kerb	0.1	0.0	0.1	30	Compliance
150 m from kerb	0.1	0.0	0.1	30	Compliance
200 m from kerb	0.1	0.0	0.1	30	Compliance
Maximum 8-hour average CO concentrations (mg/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	0.8	0.0	0.8	10	Compliance
10 m from kerb	0.3	0.0	0.3	10	Compliance
20 m from kerb	0.2	0.0	0.2	10	Compliance
30 m from kerb	0.2	0.0	0.2	10	Compliance
40 m from kerb	0.2	0.0	0.2	10	Compliance
50 m from kerb	0.1	0.0	0.1	10	Compliance
75 m from kerb	0.1	0.0	0.1	10	Compliance
100 m from kerb	0.1	0.0	0.1	10	Compliance
150 m from kerb	0.1	0.0	0.1	10	Compliance
200 m from kerb	0.1	0.0	0.1	10	Compliance
Maximum 1-hour average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	25.7	14.4	40.1	164	Compliance
10 m from kerb	15	14.4	29.4	164	Compliance
20 m from kerb	14.2	14.4	28.6	164	Compliance
30 m from kerb	11.6	14.4	26.0	164	Compliance
40 m from kerb	10.1	14.4	24.5	164	Compliance
50 m from kerb	9	14.4	23.4	164	Compliance
75 m from kerb	7.3	14.4	21.7	164	Compliance
100 m from kerb	6.2	14.4	20.6	164	Compliance
150 m from kerb	4.9	14.4	19.3	164	Compliance
200 m from kerb	4	14.4	18.4	164	Compliance
Annual average NO2 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	5.1	4.1	9.2	31	Compliance
10 m from kerb	3	4.1	7.1	31	Compliance
20 m from kerb	2.8	4.1	6.9	31	Compliance
30 m from kerb	2.3	4.1	6.4	31	Compliance
40 m from kerb	2	4.1	6.1	31	Compliance
50 m from kerb	1.8	4.1	5.9	31	Compliance
75 m from kerb	1.5	4.1	5.6	31	Compliance
100 m from kerb	1.2	4.1	5.3	31	Compliance
150 m from kerb	1	4.1	5.1	31	Compliance
200 m from kerb	0.8	4.1	4.9	31	Compliance
Maximum 24-hour average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	19.6	17.4	37.0	50	Compliance
10 m from kerb	9.1	17.4	26.5	50	Compliance
20 m from kerb	6.8	17.4	24.2	50	Compliance
30 m from kerb	5.7	17.4	23.1	50	Compliance
40 m from kerb	5	17.4	22.4	50	Compliance
50 m from kerb	4.5	17.4	21.9	50	Compliance
75 m from kerb	3.7	17.4	21.1	50	Compliance
100 m from kerb	3.1	17.4	20.5	50	Compliance
150 m from kerb	2.5	17.4	19.9	50	Compliance
200 m from kerb	2.1	17.4	19.5	50	Compliance
Annual average PM10 concentrations (ug/m3)					
Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	7.9	11.7	19.6	25	Compliance
10 m from kerb	3.6	11.7	15.3	25	Compliance
20 m from kerb	2.7	11.7	14.4	25	Compliance
30 m from kerb	2.3	11.7	14.0	25	Compliance
40 m from kerb	2	11.7	13.7	25	Compliance
50 m from kerb	1.8	11.7	13.5	25	Compliance
75 m from kerb	1.5	11.7	13.2	25	Compliance
100 m from kerb	1.3	11.7	13.0	25	Compliance
150 m from kerb	1	11.7	12.7	25	Compliance
200 m from kerb	0.8	11.7	12.5	25	Compliance

Table A.8 Predicted concentrations: Tonkiss Street

PREDICTED ROADSIDE CONCENTRATIONS AND ASSESSMENT

Maximum 1-hour average CO concentrations (mg/m3)

Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	0.1	0.0	0.1	30	Compliance
10 m from kerb	0.1	0.0	0.1	30	Compliance
20 m from kerb	0	0.0	0.0	30	Compliance
30 m from kerb	0	0.0	0.0	30	Compliance
40 m from kerb	0	0.0	0.0	30	Compliance
50 m from kerb	0	0.0	0.0	30	Compliance
75 m from kerb	0	0.0	0.0	30	Compliance
100 m from kerb	0	0.0	0.0	30	Compliance
150 m from kerb	0	0.0	0.0	30	Compliance
200 m from kerb	0	0.0	0.0	30	Compliance

Maximum 8-hour average CO concentrations (mg/m3)

Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	0.1	0.0	0.1	10	Compliance
10 m from kerb	0	0.0	0.0	10	Compliance
20 m from kerb	0	0.0	0.0	10	Compliance
30 m from kerb	0	0.0	0.0	10	Compliance
40 m from kerb	0	0.0	0.0	10	Compliance
50 m from kerb	0	0.0	0.0	10	Compliance
75 m from kerb	0	0.0	0.0	10	Compliance
100 m from kerb	0	0.0	0.0	10	Compliance
150 m from kerb	0	0.0	0.0	10	Compliance
200 m from kerb	0	0.0	0.0	10	Compliance

Maximum 1-hour average NO2 concentrations (ug/m3)

Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	10	14.4	24.4	164	Compliance
10 m from kerb	6.2	14.4	20.6	164	Compliance
20 m from kerb	6	14.4	20.4	164	Compliance
30 m from kerb	4.9	14.4	19.3	164	Compliance
40 m from kerb	4.2	14.4	18.6	164	Compliance
50 m from kerb	3.8	14.4	18.2	164	Compliance
75 m from kerb	3	14.4	17.4	164	Compliance
100 m from kerb	2.6	14.4	17.0	164	Compliance
150 m from kerb	2	14.4	16.4	164	Compliance
200 m from kerb	1.6	14.4	16.0	164	Compliance

Annual average NO2 concentrations (ug/m3)

Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	2	4.1	6.1	31	Compliance
10 m from kerb	1.2	4.1	5.3	31	Compliance
20 m from kerb	1.2	4.1	5.3	31	Compliance
30 m from kerb	1	4.1	5.1	31	Compliance
40 m from kerb	0.8	4.1	4.9	31	Compliance
50 m from kerb	0.8	4.1	4.9	31	Compliance
75 m from kerb	0.6	4.1	4.7	31	Compliance
100 m from kerb	0.5	4.1	4.6	31	Compliance
150 m from kerb	0.4	4.1	4.5	31	Compliance
200 m from kerb	0.3	4.1	4.4	31	Compliance

Maximum 24-hour average PM10 concentrations (ug/m3)

Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	7.7	17.4	25.1	50	Compliance
10 m from kerb	3.7	17.4	21.1	50	Compliance
20 m from kerb	2.8	17.4	20.2	50	Compliance
30 m from kerb	2.4	17.4	19.8	50	Compliance
40 m from kerb	2.1	17.4	19.5	50	Compliance
50 m from kerb	1.8	17.4	19.2	50	Compliance
75 m from kerb	1.5	17.4	18.9	50	Compliance
100 m from kerb	1.3	17.4	18.7	50	Compliance
150 m from kerb	1	17.4	18.4	50	Compliance
200 m from kerb	0.8	17.4	18.2	50	Compliance

Annual average PM10 concentrations (ug/m3)

Receptor location	Due to roadway	Background	Cumulative	Criteria	Assessment
At kerb (0 m)	3.1	11.7	14.8	25	Compliance
10 m from kerb	1.5	11.7	13.2	25	Compliance
20 m from kerb	1.1	11.7	12.8	25	Compliance
30 m from kerb	0.9	11.7	12.6	25	Compliance
40 m from kerb	0.8	11.7	12.5	25	Compliance
50 m from kerb	0.7	11.7	12.4	25	Compliance
75 m from kerb	0.6	11.7	12.3	25	Compliance
100 m from kerb	0.5	11.7	12.2	25	Compliance
150 m from kerb	0.4	11.7	12.1	25	Compliance
200 m from kerb	0.3	11.7	12.0	25	Compliance

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