Air Noise Environment
Environmental Monitoring and Assessment

Ambient Air Quality Monitoring Report (February 2015)

Leighton Contractors Pty Limited

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Kedron

QLD 4031

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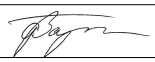
01	Brett Verran	Craig Beyers	
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1 Introduction

Leighton Contractors Pty Limited commissioned Air Noise Environment Pty Ltd to undertake ambient air quality monitoring at 5 locations in proximity to the Airport Link project. The monitoring was undertaken as part of their requirements of the Conditions of Approval (**"the Conditions"**) issued by the Coordinator General in June 2007[1] for the project. Measured concentrations are compared to the criteria specified in Condition 19(k) of the Conditions.

Table 1.1 details the monitoring locations and the monitoring performed at each location. The data presented in this report is for monitoring completed during the period 1 February 2015 to 28 February 2015.

Table 1.1: Monitoring Locations and Parameters

Parameter	Monitoring Location				
Species	**Station 1 (Aviation High School)**	**Station 2 (Kedron High School)**	**Station 3 (Lewis Street)**	**Station 4 (Airport Link Operations Centre)**	**Station 5 (Bryden Street)**
Carbon Monoxide	X	X	X	X	X[2]
Nitrogen oxide (NO) and Nitrogen Dioxide (NO_2)	X	X	X	X	X
PM_{10} (Beta Attenuation Monitor)	X	X	X	X	X
$PM_{2.5}$ (Beta Attenuation Monitor)	X	X[1]	X[1]	X	X
Total Suspended Particulate (TSP)	X	X	X	X	X

[1] No data collected for Station 2 due to failed sample rate validation and 3 due to instrument fault.

[2] No data collected for Station 5 due to an instrument fault.

1 Coordinator-General's Report on the Environmental Impact Statement for the proposed Airport Link Project (July 2007)

2 Methodology

2.1 Monitoring Methodology

Table 2.1 below lists the methods used when completing the ambient air quality monitoring.

Table 2.1: Air Quality Monitoring Methodologies

Measurement Parameter	Method Equivalency
Carbon Monoxide	***AS 3580.7.1-2011*** *Methods for sampling and analysis of ambient air - Determination of carbon monoxide - Direct-reading instrumental method* **AS 3580.7.1-2011/Amdt 1-2012** Methods for sampling and analysis of ambient air - Determination of carbon monoxide - Direct-reading instrumental method
Nitrogen oxide (NO) and nitrogen dioxide (NO_2)	**AS 3580.5.1-2011** Methods for sampling and analysis of ambient air - Determination of oxides of nitrogen - Direct-reading instrumental method
PM_{10} (Beta Attenuation Monitor)	**AS/NZS 3580.9.11:2008** Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM_{10} beta attenuation monitors **AS/NZS 3580.9.11:2008/Amdt 1:2009** Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM_{10} beta attenuation monitors
$PM_{2.5}$ (Beta Attenuation Monitor)	USEPA Federal Equivalence Method for Continuous Monitoring of $PM_{2.5}$ (EQPM 0308-170)
Total Suspended Particulate (TSP) (High Volume Air Sampler)	**AS/NZS 3580.9.3:2003** Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - Total suspended particulate matter (TSP) - High volume sampler gravimetric method

2.2 Laboratory Analysis

Table 2.2 provides a list of the NATA accredited laboratory that performed the applicable analysis for the high volume sampler monitoring.

Table 2.2: NATA Accredited Analysis Laboratory with NATA Accreditation Number

Measurement Parameter	NATA Accredited Laboratory
Total Suspended Particulate (TSP) (High Volume Air Sampler)	Air Noise Environment Pty Ltd - 15841

3 Results

3.1 Monitoring Locations

Table 3.1 identifies the locations of each of the five ambient air quality monitoring stations.

Table 3.1: Monitoring Station Locations

Station	Description	Latitude	Longitude
Station 1	Aviation High School Car Park	-27.412919°	153.063354°
Station 2	Kedron High School Ovals	-27.413204°	153.038291°
Station 3	Lewis Street	-27.410987°	153.055050°
Station 4	Airport Link Operations Centre	-27.412007°	153.032864°
Station 5	Bryden Street	-27.439607°	153.034940°

3.2 Nitrogen Dioxide

Table 3.2 and Figure 3.1 presents a summary of 1 hour average nitrogen dioxide concentrations measured during the period 1 February 2015 to 28 February 2015. The monitoring results presented in Table 3.2 confirm that compliance with the air quality criteria provided in Condition 19(k) of the Conditions for the Airport Link project was achieved for this period.

Table 3.2: Summary of 1 Hour Average Nitrogen Dioxide Concentration (ppb)

Station	Maximum	Average	95th Percentile	90th Percentile	75th Percentile	50th Percentile	Number of Exceedences
Station 1	15.1	4.9	10.1	8.5	6.0	4.1	0
Station 2	19.4	6.8	13.9	12.4	8.3	5.7	0
Station 3	14.0	4.0	8.3	7.1	5.1	3.4	0
Station 4	15.3	4.4	9.6	8.3	6.7	4.4	0
Station 5	15.8	6.0	11.8	9.8	7.3	5.4	0
Coordinator General's Conditions of Approval Criteria = 120 ppb (0.12 ppm)							

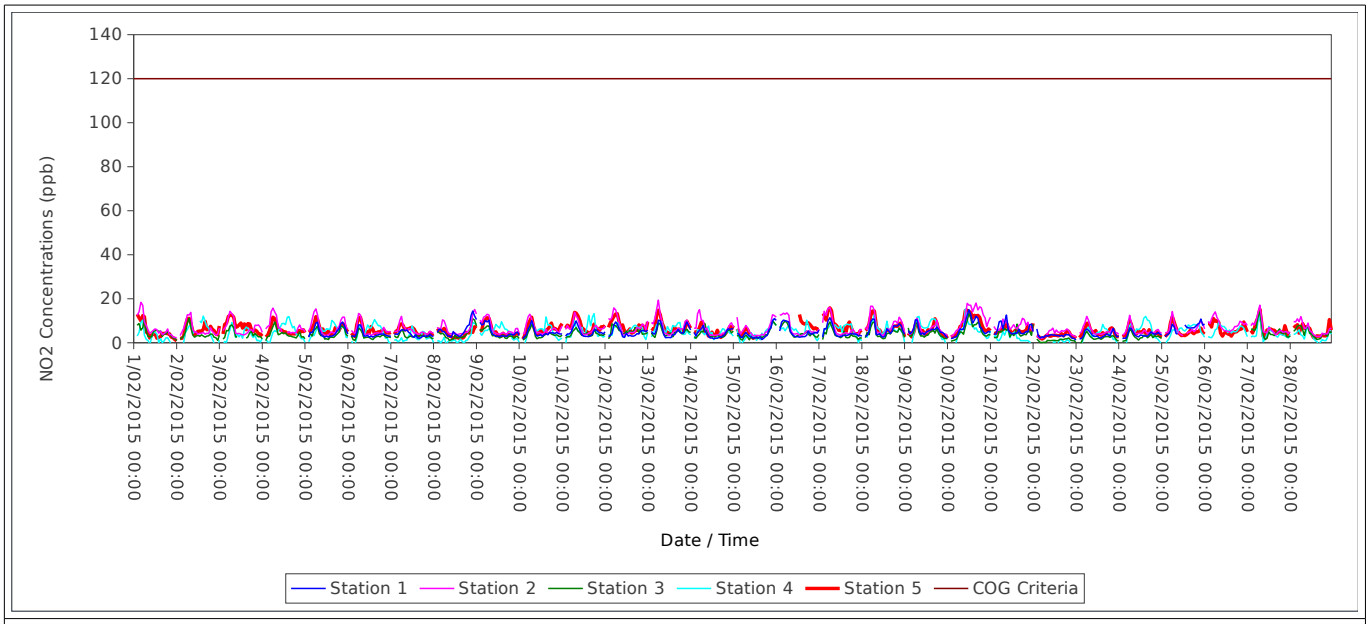

Figure 3.1: 1 hour average NO_2 concentrations (ppb)

Coordinator General's Conditions of Approval Criteria = 0.12 ppm (120 ppb)

3.3 Carbon Monoxide

Table 3.3 and Figure 3.2 presents a summary of 8 hour average carbon monoxide concentrations measured during the period 1 February 2015 to 28 February 2015. The monitoring results presented in Table 3.3 confirm that compliance with the air quality criteria provided in Condition 19(k) of the Conditions for the Airport Link project was achieved for this period.

Table 3.3: Summary of 8 Hour Average Carbon Monoxide Concentration (ppb)

Station	Maximum	Average	95th Percentile	90th Percentile	75th Percentile	50th Percentile	Number of Exceedences
Station 1	450.5	183.4	250.9	236.4	203.6	177.8	0
Station 2	641.2	396.1	555.3	517.5	464.5	408.9	0
Station 3[2]	231.8	187.3	228.1	223.1	204.0	183.5	0
Station 4	473.5	243.8	341.3	318.7	280.6	237.5	0
Station 5[1]	-	-	-	-	-	-	-

Coordinator General's Condition of Approval Criteria = 8000 ppb (8 ppm)

[1]No data collected for Station 5 due to an instrument fault.

[2]Data summary based on available data from 26/02/2015 for this station.

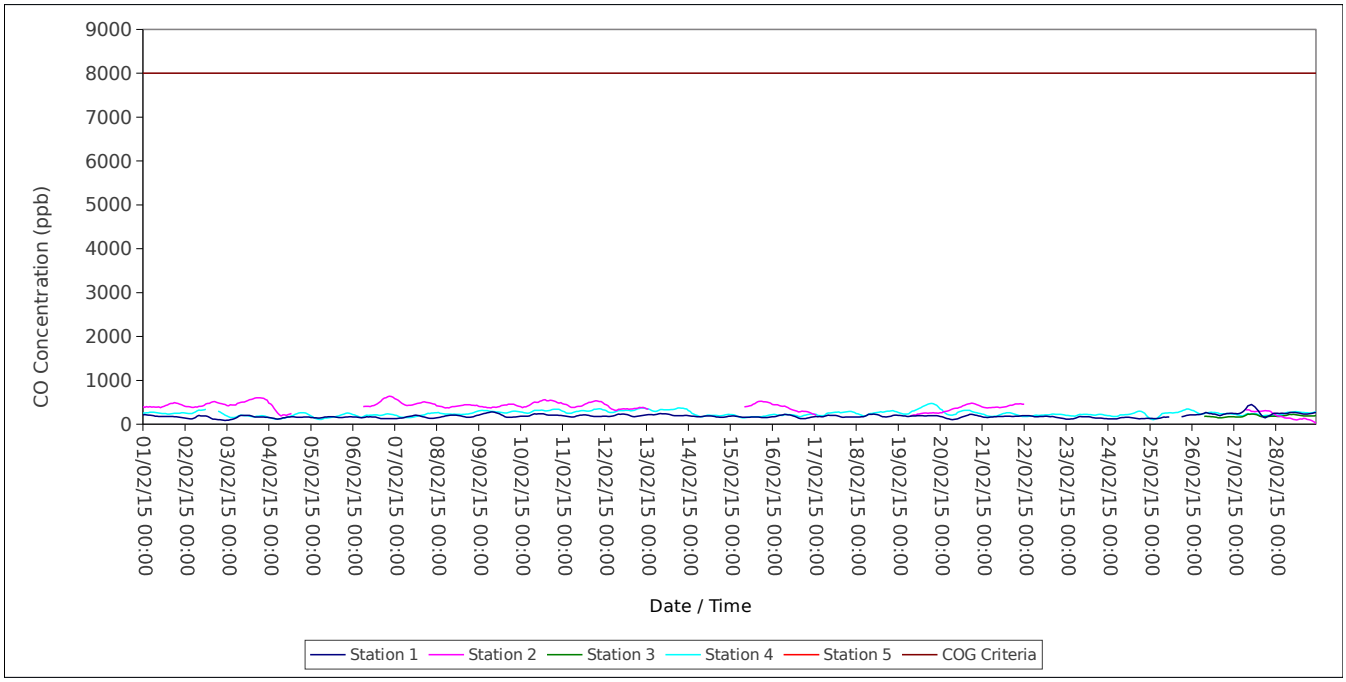

Figure 3.2: 8 hour average CO concentrations (ppb)

Coordinator General's Conditions of Approval Criteria = 8 ppm (8000 ppb)

3.4 $PM_{2.5}$

Table 3.4 and Figure 3.3 presents a summary of 24 hour average $PM_{2.5}$ concentrations measured during the period 1 February 2015 to 28 February 2015. The monitoring results presented in Table 3.4 confirm that compliance with the air quality criteria provided in Condition 19(k) of the Conditions for the Airport Link project was achieved for this period.

Table 3.4: Summary of 24 Hour Average $PM_{2.5}$ Concentration (µg/m^3)

Station	Maximum	Average	95th Percentile	90th Percentile	75th Percentile	50th Percentile	Number of Exceedences
Station 1	7.3	3.3	5.6	5.2	4.5	3.3	0
Station 2[1]	-	-	-	-	-	-	-
Station 3[2]	-	-	-	-	-	-	-
Station 4	8.1	5.2	7.8	7.4	6.6	5.2	0
Station 5	6.9	3.9	6.6	5.6	4.7	4.3	0

Coordinator General's Conditions of Approval Criteria = 25 µg/m^3

[1]No data collected for Station 2 due to failed sample rate validation checks.

[2]No data collected for Station 3 due to an instrument fault.

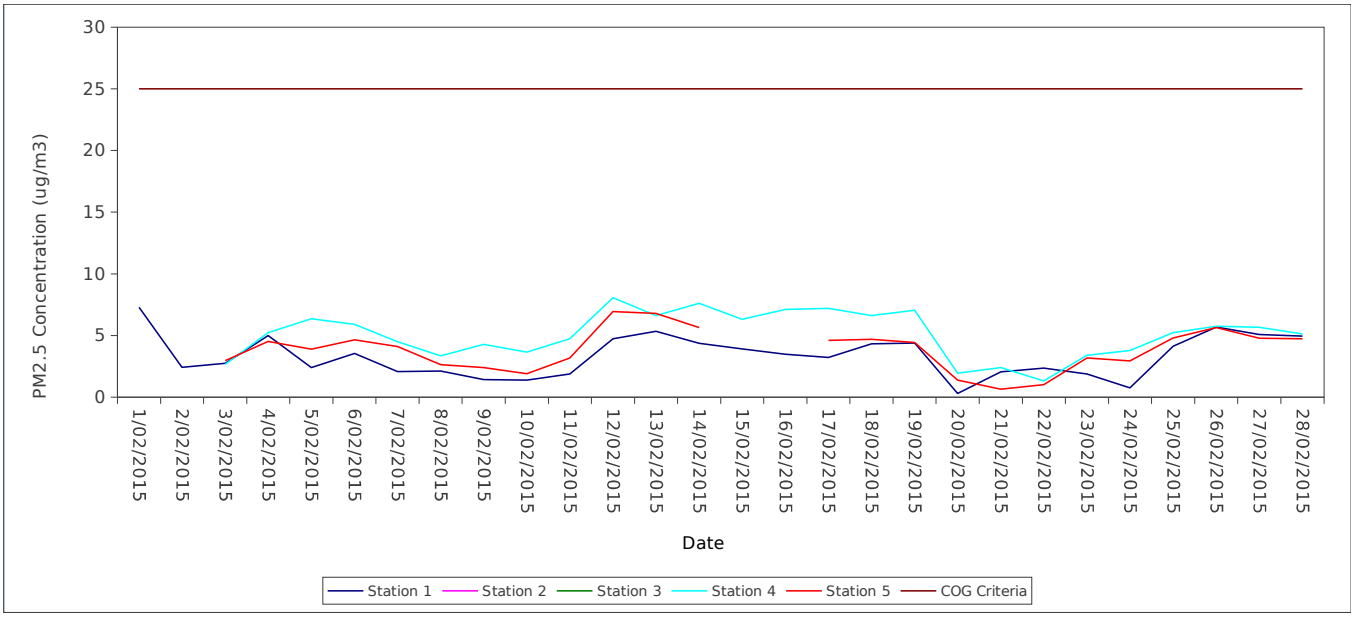

Figure 3.3: 24 hour average $PM_{2.5}$ concentrations (µg/m^3)

Coordinator General's Conditions of Approval Criteria = 25 µg/m^3

3.5 PM_{10}

Table 3.5 and Figure 3.4 presents a summary of 24 hour average PM_{10} concentrations measured during the period 1 February 2015 to 28 February 2015. The monitoring results presented in Table 3.5 confirm that compliance with the air quality criteria provided in Condition 19(k) of the Conditions for the Airport Link project was achieved for this period.

Table 3.5: Summary of 24 Hour Average PM_{10} Concentration ($\mu g/m^3$)

Station	Maximum	Average	95th Percentile	90th Percentile	75th Percentile	50th Percentile	Number of Exceedences
Station 1	18.9	9.1	16.0	15.6	12.1	8.9	0
Station 2	21.0	12.4	19.3	18.6	15.8	12.7	0
Station 3	16.5	8.1	15.8	14.8	12.6	8.3	0
Station 4	21.8	13.3	20.4	18.9	15.3	13.3	0
Station 5	23.0	13.3	22.3	21.1	17.8	13.5	0

Coordinator General's Approval Condition Criteria = 50 $\mu g/m^3$

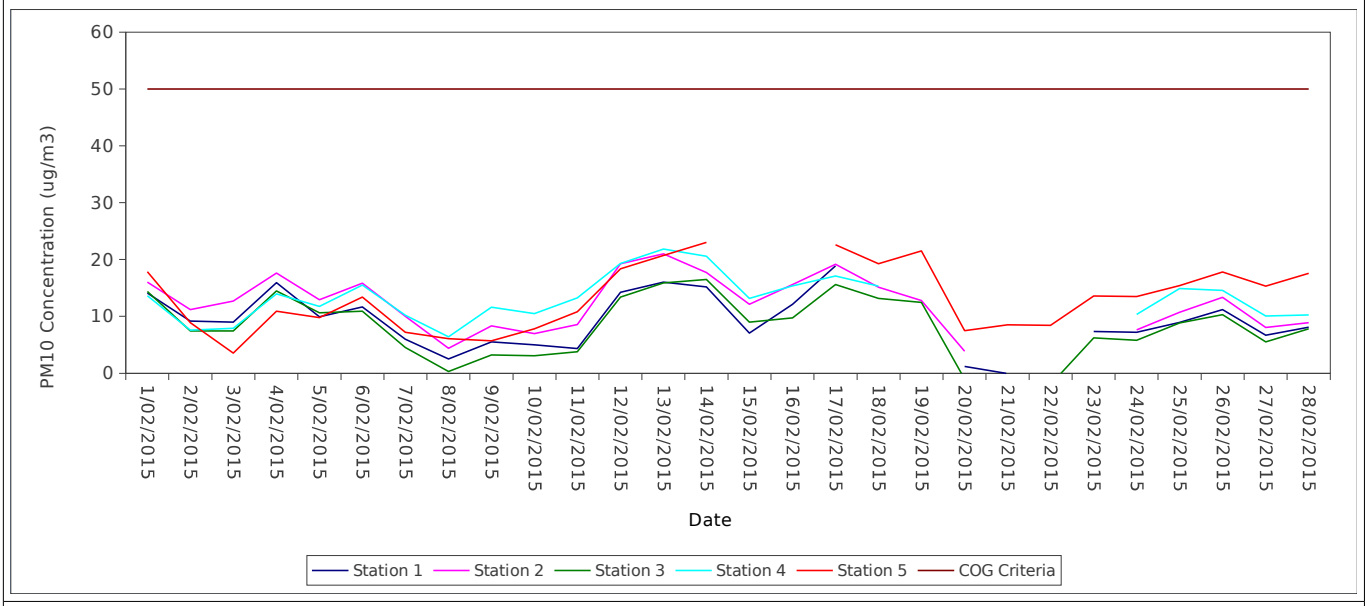

Figure 3.4: 24 hour average PM_{10} concentrations ($\mu g/m^3$)

Coordinator General's Conditions of Approval Criteria = 50 $\mu g/m^3$

3.6 Total Suspended Particulate

Table 3.6 presents a summary of 24 hour average total suspended particulate concentrations measured during the period 1 February 2015 to 28 February 2015. Total suspended particulates are presented on a 1 day in 6 cycle as was required for the project.

Table 3.6: Summary of 24 Hour Average Total Suspended Particulate Concentrations (µg/m^3)

Station	Maximum	Average
Station 1	39.2	25.8
Station 2	35.9	24.2
Station 3	36.9	30.1
Station 4	38.6	27.1
Station 5	27.7	21.5

Table 3.7 presents a summary of annual average TSP concentrations for the period 1 March 2014 to 28 February 2015. The monitoring results presented in Table 3.7 confirm that compliance with the air quality criteria provided in Condition 19(k) of the Conditions for the Airport Link project was achieved for this period.

Table 3.7: Summary of Annual Average Total Suspended Particulate Concentrations (µg/m^3)

Station	Average
Station 1	27.7
Station 2	27.3
Station 3	25.3
Station 4	28.1
Station 5	25.9
Coordinator General's Conditions of Approval Annual Average Criteria = 90 µg/m^3	

4 Data Outages

Table 4.1 presents a summary of data outages where the data loss occurred for longer than 8 consecutive hours.

Table 4.1: Summary of Data Outages

Station	Date	Channels	Reason for Outage
1	01/02/2015 00:00 - 05/02/2015 02:00	NO_2	Calibration drift
	26/02/2015 01:00 - 01/03/2015 00:00	NO_2	Calibration drift
	18/02/2015 15:00 - 18/02/2015 23:00	PM_{10}	Out of range
	19/02/2015 13:00 - 20/02/2015 05:00	PM_{10}	Out of range
2	04/02/2015 12:00 - 06/02/2015 00:00	CO	Instrument fault
	13/02/2015 01:00 - 15/02/2015 02:00	CO	Calibration drift
	17/02/2015 01:00 - 19/02/2015 02:00	CO	Calibration drift
	22/02/2015 00:00 - 27/02/2015 00:00	CO	Instrument fault
	01/02/2015 00:00 - 01/03/2015 00:00	$PM_{2.5}$	Failed sample rate validation checks
	21/02/2015 15:00 - 23/02/2015 15:00	PM_{10}	Tape break
3	01/02/2015 00:00 - 26/02/2015 02:00	CO	Instrument fault
	25/02/2015 01:00 - 27/02/2015 02:00	NO_2	Calibration drift
	01/02/2015 00:00 - 01/03/2015 00:00	$PM_{2.5}$	Instrument fault
4	19/02/2015 15:00 - 23/02/2015 14:00	PM_{10}	Tape break
5	01/02/2015 00:00 - 01/03/2015 00:00	CO	Instrument fault
	15/02/2015 15:00 - 16/02/2015 13:00	NO_2, PM_{10}, $PM_{2.5}$	High rack temp
	01/02/2015 00:00 - 02/02/2015 18:00	$PM_{2.5}$	Background cycle

5 Spreadsheet Data

Attached to this document is a spreadsheet file (.xls) containing all valid data for the period 1 February 2015 to 28 February 2015. Data that has failed Quality Assurance checks is not included in the spreadsheets.

The file(s) contains the following data:

Sheet List in File

- Sheet 1Hr – Hourly Data
  - Column A – Date / Time
  - Column B – Station 1 - CO (ppb)
  - Column C – Station 1 – NO (ppb)
  - Column D – Station 1 - NO_2 (ppb)
  - Column E – Station 1 - NO_x (ppb)
  - Column F – Station 1 – $PM_{2.5}$ ($\mu g/m^3$)
  - Column G – Station 1 – PM_{10} ($\mu g/m^3$)
  - Column H – Station 2 – CO (ppb)
  - Column I – Station 2 - NO (ppb)
  - Column J – Station 2 - NO_2 (ppb)
  - Column K – Station 2 - NO_x (ppb)
  - Column L – Station 2 – $PM_{2.5}$ ($\mu g/m^3$)
  - Column M – Station 2 – PM_{10} ($\mu g/m^3$)
  - Column N – Station 3 - CO (ppb)
  - Column O – Station 3 – NO (ppb)
  - Column P – Station 3 - NO_2 (ppb)
  - Column Q – Station 3 - NO_x (ppb)
  - Column R – Station 3 – $PM_{2.5}$ ($\mu g/m^3$)
  - Column S – Station 3 – PM_{10} ($\mu g/m^3$)
  - Column T – Station 4 - CO (ppb)
  - Column U – Station 4 – NO (ppb)
  - Column V – Station 4 - NO_2 (ppb)
  - Column W – Station 4 - NO_x (ppb)
  - Column X – Station 4 – $PM_{2.5}$ ($\mu g/m^3$)

- Column Y – Station 4 – PM_{10} ($\mu g/m^3$)
- Column Z – Station 5 - CO (ppb)
- Column AA – Station 5 – NO (ppb)
- Column AB – Station 5 - NO_2 (ppb)
- Column AC – Station 5 - NO_x (ppb)
- Column AD – Station 5 – $PM_{2.5}$ ($\mu g/m^3$)
- Column AE – Station 5 – PM_{10} ($\mu g/m^3$)

- Sheet 8Hr – Rolling 8 Hour Average Data
  - Column A – Date / Time
  - Column B – Station 1 - CO (ppb)
  - Column C – Station 2 - CO (ppb)
  - Column D – Station 3 - CO (ppb)
  - Column E – Station 4 - CO (ppb)
  - Column F – Station 5 - CO (ppb)

- Sheet 24Hr – Daily Average Data
  - Column A – Date / Time
  - Column B – Station 1 – $PM_{2.5}$ ($\mu g/m^3$)
  - Column C – Station 1 – PM_{10} ($\mu g/m^3$)
  - Column D – Station 1 – TSP ($\mu g/m^3$)
  - Column E – Station 2 – $PM_{2.5}$ ($\mu g/m^3$)
  - Column F – Station 2 – PM_{10} ($\mu g/m^3$)
  - Column G – Station 2 – TSP ($\mu g/m^3$)
  - Column H – Station 3 – $PM_{2.5}$ ($\mu g/m^3$)
  - Column I – Station 3 – PM_{10} ($\mu g/m^3$)
  - Column J – Station 3 – TSP ($\mu g/m^3$)
  - Column K – Station 4 – $PM_{2.5}$ ($\mu g/m^3$)
  - Column L – Station 4 – PM_{10} ($\mu g/m^3$)
  - Column M – Station 4 – TSP ($\mu g/m^3$)
  - Column N – Station 5 – $PM_{2.5}$ ($\mu g/m^3$)

- Column O – Station 5 – PM_{10} (µg/m^3)
- Column P – Station 5 – TSP (µg/m^3)

Averaging times are reported for the start of the time period, i.e. the hourly average 04:00 is for the data collected for the five minute sample periods with start times from 04:00 am to 04:55 am. All average data has been calculated from 5 minute continuous data.

The data between 01:00 am and 02:00 am is not recorded. During this hour the daily zero and span checks are performed by the instruments.

Appendix A – Glossary of Terms

APPENDIX A: GLOSSARY OF TERMS	
<	The analytes tested for were not detected; the value stated is the reportable limit of detection
µg	Micrograms (10^{-6}grams)
Am^3	Gas volume in cubic metres at measured conditions
AS	Australian Standard
g	grams
kg	kilograms
m	metres
m^3	Cubic Metres, actual gas volume in cubic metres as measured
mb	Millibars
mg	Milligrams
min	Minute
mg/m^3	Milligrams (10^{-3}) per cubic metre
Mole	SI Unit defined as an amount of a substance that contains as many elementary entities (e.g. atoms, molecules, ions, electrons) as there are atoms in 12 grams of pure Carbon-12 (^{12}C)
N/A	Not Applicable
ng	Nanograms (10^{-9} grams)
°C	Degrees Celsius
$µg/m^3$	Micrograms (10^{-6}) per cubic metre. Conversions from $µg/m^3$ to parts per volume concentrations (ie, ppb) are calculated at 25 °C
ppb / ppm	Parts per billion / million
PM	Particulate Matter
PM_{10}, $PM_{2.5}$, PM_1	Fine particulate matter with an equivalent aerodynamic diameter of

APPENDIX A: GLOSSARY OF TERMS	
	less than 10, 2.5 or 1 micrometres respectively. Fine particulates are predominantly sourced from combustion processes. Vehicle emissions are a key source in urban environments
sec	Second
Sm^3	Standardised Cubic Metres - Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa) and corrected to a standardised value (e.g. 7% O_2)
STP	Standard Temperature and Pressure (0°C and 101.3 kPa)
TSP	Total Suspended Particulate
TVOC	Total Volatile Organic Compounds. These compounds can be both toxic and odorous