

9. Conclusion

This report has assessed the likely air quality impact of the rehabilitation works proposed for the Munmorah Power Station.

Munmorah Power Station has previously been required to demonstrate compliance with Group 2 emission standards. The DECC Regulation requires older plant operating in NSW to comply with Group 5 emission standards by 2012 as stipulated in the Protection of the Environment Operations (Clean Air) Act (NSW). The Munmorah EPL requires compliance with Group 6 emission standards.

Previous studies have found that emissions of all pollutants (with the exception of NO_x) have been compliant with Group 6 emission standards under all normal operating conditions. The rehabilitation will enable NO_x emissions to be compliant with the Group 6 standards under most operating conditions with the possible exception of the plant operating at lower plant loads. There is no regulatory requirement for compliance with these stringent limits through plant start up and shut down (periods of low load). There is a requirement and the plant will comply with the requirement to comply with the emissions limit through continuous steady operation.

As Munmorah will operate as a base load power station following rehabilitation, the periods when the power station is operating at low loads would be greatly reduced. Comprehensive combustion modelling of the rehabilitated power station, incorporated by the installation of low NO_x burners, suggests that the Group 6 NO_x limits are likely to be achievable, even at low loads.

In addition to this Delta Electricity has also committed to a reduction in the sulphur content in coal from 1.0% to 0.7% sulphur. The level of sulphur in the coal is the primary determinant of SO₂ air emissions.

The primary conclusions from this study are discussed in terms of impacts at the nearest sensitive receivers (local), regional air quality, ambient air quality impacts for other pollutants as prescribed and the adequacy of the compliance monitoring program.

Local air quality impacts

The analysis of the existing environment has shown that the air quality is good through this region and following plant rehabilitation the air quality will remain so.

The likelihood of exceedances of short term guideline limits for SO₂, NO₂ or PM₁₀ pollutants beyond what is acceptable for the latter most (given there are five

exceedances per year that are allowable); is unlikely when considered in light of the limitations in the approved modelling tools used and the conservative assumptions made in the analysis.

Regional air quality impacts

The analysis of the existing environment has shown that the air quality is good through this region and following plant rehabilitation the air quality will remain so.

There is likely to be little to no adverse impacts upon regional air quality through this region – in terms of reduced incidence of neither peak ozone concentrations nor NO₂ ground level concentrations. This conclusion is made as a large amount of evidence points to the regional atmosphere being limited of anthropogenic volatile organic compound sources, and there being a surplus of NO_x.

Other pollutants

Emissions of the compounds that have been classified as including but not limited to trace elements (including Pb), CO, VOCs and subset groups including polycyclic aromatic hydrocarbons (PAHs), are already compliant with Group 6 emission standards. There will be negligible change in the air quality impact with respect to the emissions of these pollutants following plant rehabilitation.

Air quality monitoring network

The current air quality monitoring network is able to adequately capture the worst case air quality impacts from Munmorah following the rehabilitation program, assuming the concurrent operation of Munmorah, Colongra gas turbine, Vales Point and other major industrial facilities and diffuse source air emissions.

10. References

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Attachment A

Emission limits comparison – Malfroy (2007) extract



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4. Review of emission concentrations and Clean Air Regulation emission limits

Table 1 presents an assessment of Munmorah's emission concentrations against the standard concentrations prescribed in the Clean Air Regulation for facilities included in Group 6. Measurements were undertaken in accordance with the Approved Methods for Sampling and Analysis of Air Pollutants in NSW (DEC 2005). The table shows that with the exception of the oxides of nitrogen, emission concentrations from Munmorah Power Station are below the Group 6 standards.

Table 1: Munmorah Licence Variation – Assessment against Group 6 emission limits

Substance	Limit mg/m ³ (unless noted otherwise)	Averaging time	Munmorah performance 2004 - 2006 mg/m ³	Comment – data source (EPL Environment Protection licence)
Solid particles	50	(1)	<u>Unit 3:</u> 11.5 – 51.6 Average 29.6 <u>Unit 4:</u> 3.4 – 13.6 Average: 8.3	EPL – annual batch sample
NO ₂ or NO or both expressed as NO ₂ equivalent	500	1 hour block	900 (~ 650 @ full load)	EPL -CEMS
Fluorine, as HF equivalent	50	(1)	<u>Unit 3:</u> 1.7 – 8.7 Average: 4.1 <u>Unit 4:</u> 0.2 – 14.5 Average: 5.6	EPL – annual batch sample
Type 1 and Type 2 substances in aggregate (2)	1	(1)	<u>Unit 3:</u> 0.003 – 0.11 Average: 0.05 <u>Unit 4:</u> 0.02 – 0.11 Average: 0.06	EPL – annual batch sample (most results for individual metals < LOD. For calculations results assumed to equal the LOD.
Cd or Hg individually	0.2	(1)	<u>Cd Unit 3 & 4</u> <0.00007 – 0.002 Average: 0.00132 <u>Hg Unit 3 & 4</u> <0.00007 - 0.004 Average: 0.00030	EPL – annual batch sample. See comment above.

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Substance	Limit mg/m ³ (unless noted otherwise)	Averaging time	Munmorah performance 2004 - 2006 mg/m ³	Comment – data source (EPL Environment Protection licence)
VOCs as n propane	40 VOC or 125 CO	1 hour rolling	Unit 3 & 4 2006 < 5 No VOC peak detected	EPL – batch (measurement of CO not required by EPL)
Smoke (3)	In approved circumstances: Ringlemann 3 or 60% opacity In other circumstances: Ringlemann 1 or 20% opacity	6 minutes rolling	< 10% (4)	EPL - CEMS for “undifferentiated particles”.
Hydrogen chloride	100	(1)	Unit 3 and 4 0.2 – 4.5 Average: 4.1	EPL – annual batch sample
Chlorine (Cl ₂)	200	1 hour block	Unit 3 and 4 0.005 – 0.4 Average: 0.16	EPL – annual batch sample
Hydrogen sulphide	5	1 hour block	Below level of detection (5)	Testing not required by EPL
Sulfuric acid mist or Sulfur trioxide or both expressed as sulfur trioxide equivalent	100	(1)	Unit 3 & 4 0.9 – 2.1 Average: 1.4	EPL – annual batch sample
Dioxin or furans (6)	0.1 ng/m ³		0.0013 ng/m ³ (average of 2 tests) (5)	Testing not required by EPL

1. 1 hour, or minimum sampling period specified in the relevant test method, whichever is the greater.
2. Type 1: antimony, arsenic, cadmium, lead or mercury
Type 2: Beryllium, chromium, cobalt, manganese, nickel, selenium, tin & vanadium.
3. Approved circumstances – as applicable to Munmorah;
for a period of not more than 20 minutes per 24 hours after lighting a boiler or incinerator from cold, being the period that the boiler or incinerator is brought up to normal operation and

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that all practicable means are employed to prevent or minimise the emission of smoke during that period.

4. Opacity is not recorded at Munmorah. Instruments output data in mg/m^3 . Opacity data have been sourced from Vales Point Unit 6 which is now equipped with pulse jet bag filters and should be indicative of opacity in Munmorah ducts.
5. Based on measurements at Vales Point Power Station. Stephenson and Associates 1999.
6. Dioxins or furans limit of $0.1 \text{ ng}/\text{m}^3$, only applies to non-standard fuels containing precursors of dioxin or furan formation.

5. NO_x Emissions

Table 1 indicated that NO_x emissions from Munmorah Power Station exceed the Group 6 emission limit of $500 \text{ mg}/\text{m}^3$ (as NO_2). As shown in Figure 1, at low load concentrations also exceed the Group 5 limit of $800 \text{ mg}/\text{m}^3$. However, Figure 1 also shows that at full load NO_x concentrations are less than at low load and below the Group 5 limit, although still above the Group 6 limit. This application seeks approval for Munmorah to continue to emit NO_x at current emission levels, recognising that Delta Electricity will need to reassess NO_x emissions from Munmorah Power Station with the phasing out of Group 2² emission limits in 2012. In the next section the potential air quality impacts from continuing operation at existing NO_x levels are assessed.

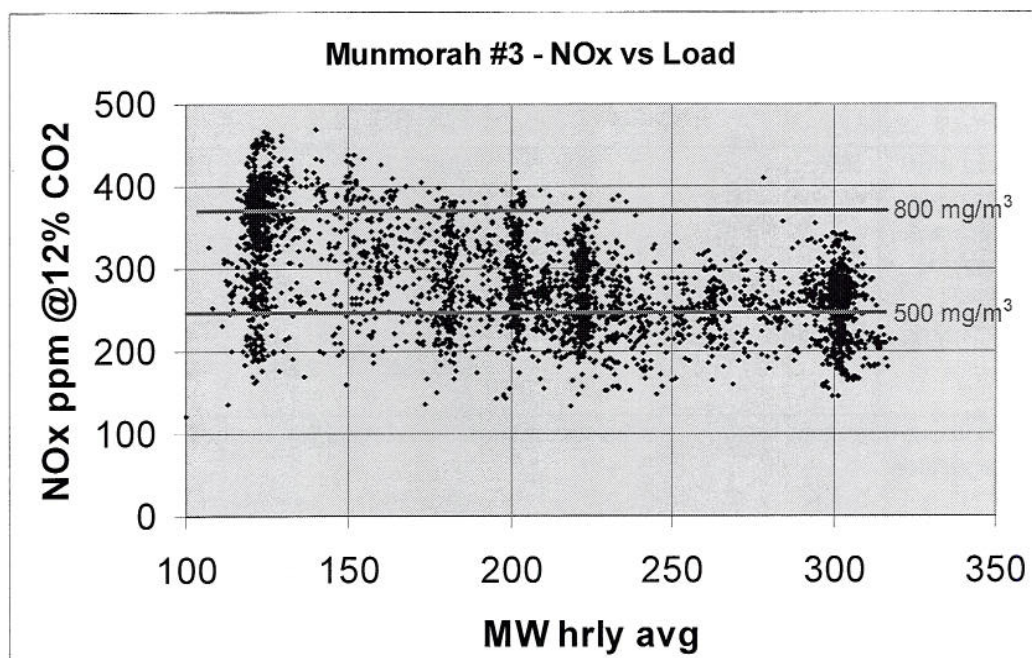


Figure 1: NO_x concentrations versus load at Munmorah Power Station. (PPI 2000)

² Note that the NO_x emission limit is the same for Groups 1, 2, 3 and 4.



Attachment B

Pollutant contours – SO₂, NO₂ and PM₁₀ and Report of
Central Coast Air Quality Coal Sulfur Investigations



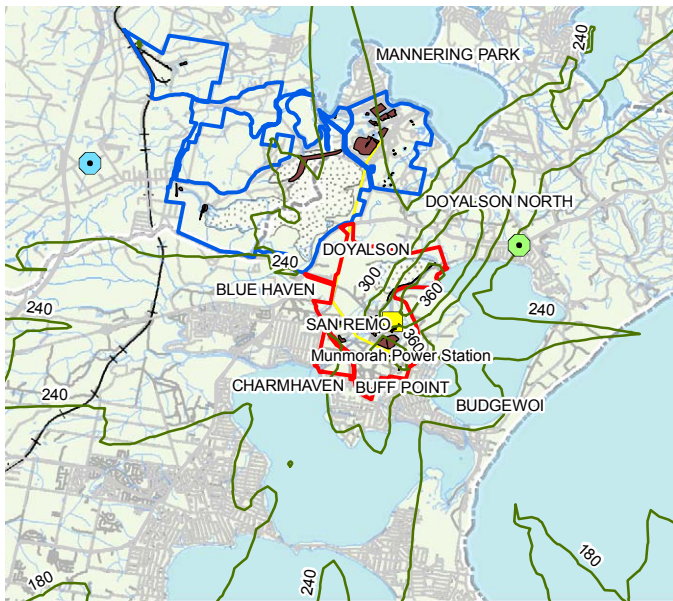


FIGURE 1a: SO₂ 10 minute average ground level concentration ($\mu\text{g}/\text{m}^3$)

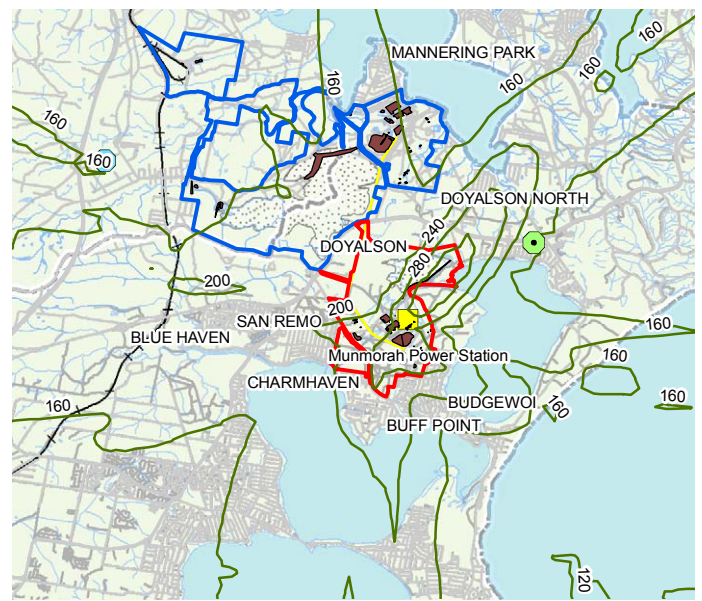


FIGURE 1b: SO₂ hourly average ground level concentration ($\mu\text{g}/\text{m}^3$)

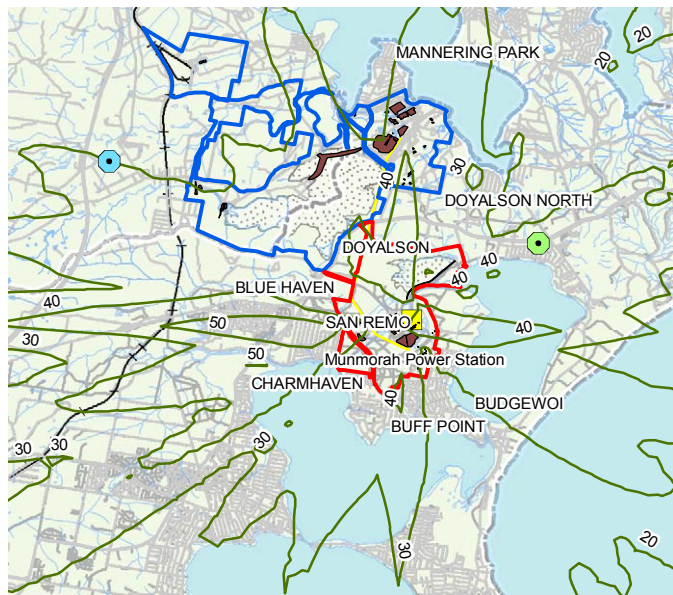


FIGURE 1c: SO₂ daily average ground level concentration ($\mu\text{g}/\text{m}^3$)

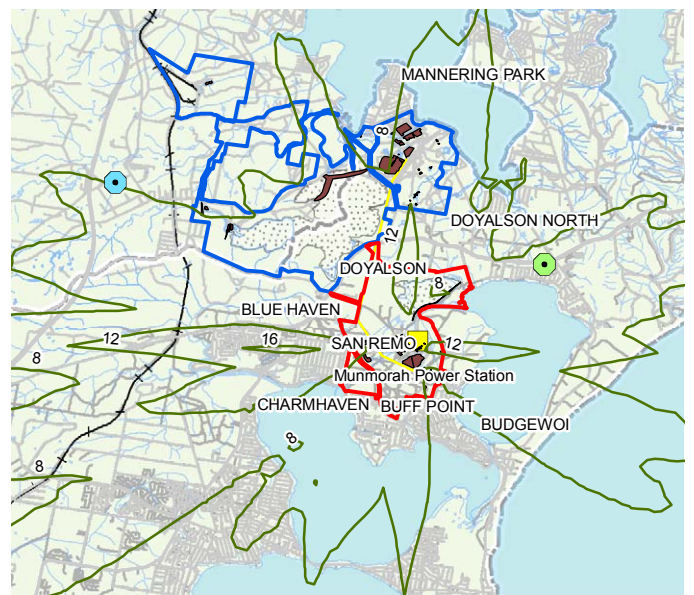


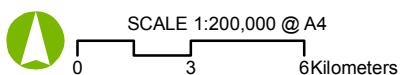
FIGURE 1d: SO₂ annual average ground level concentration ($\mu\text{g}/\text{m}^3$)

Legend

- MV Conveyor
- SO₂ contours
- Wye air monitoring station
- Lake Munmorah PS air monitoring station
- Colongra Gas Turbine Facility
- Munmorah Power Station
- Vales Point Power Station
- Buildings and Infrastructure
- Local Government Area

Source: TAPM Modelling

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Projection: MGA

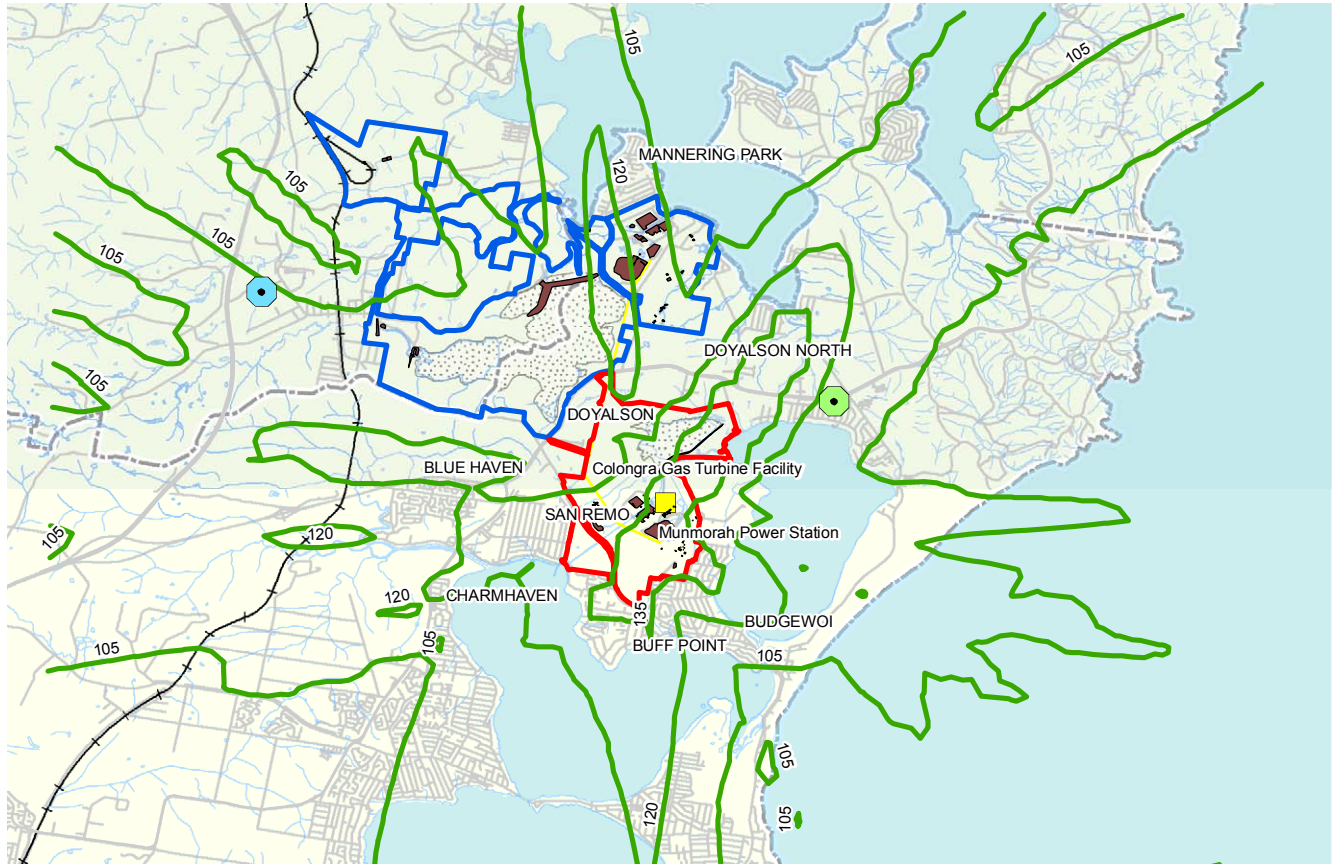


FIGURE 2a: NO₂ hourly average ground level concentration (µg/m³)

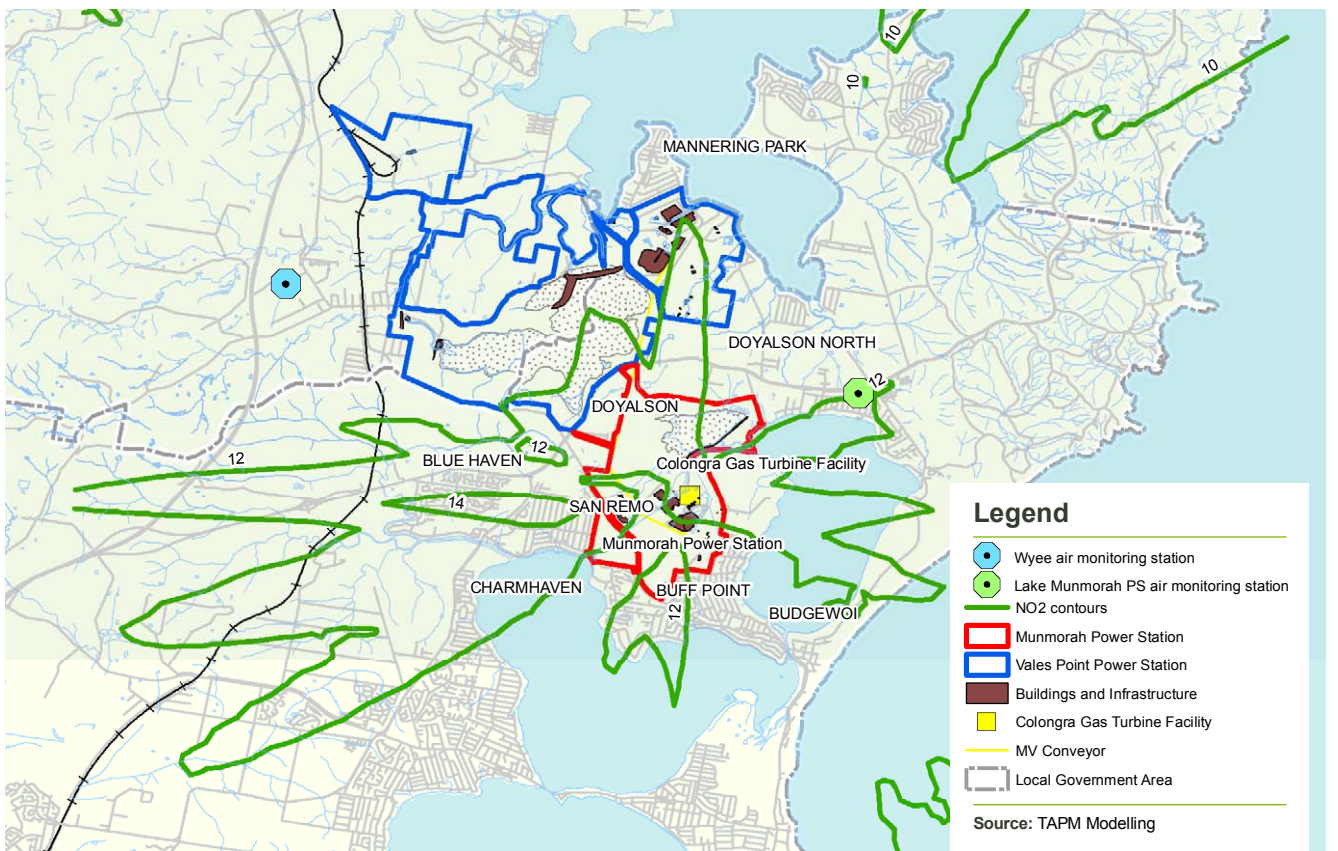


FIGURE 2b: NO₂ annual average ground level concentration (µg/m³)

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SCALE 1:150,000 @ A4
0 2 4 Kilometers

Projection: MGA

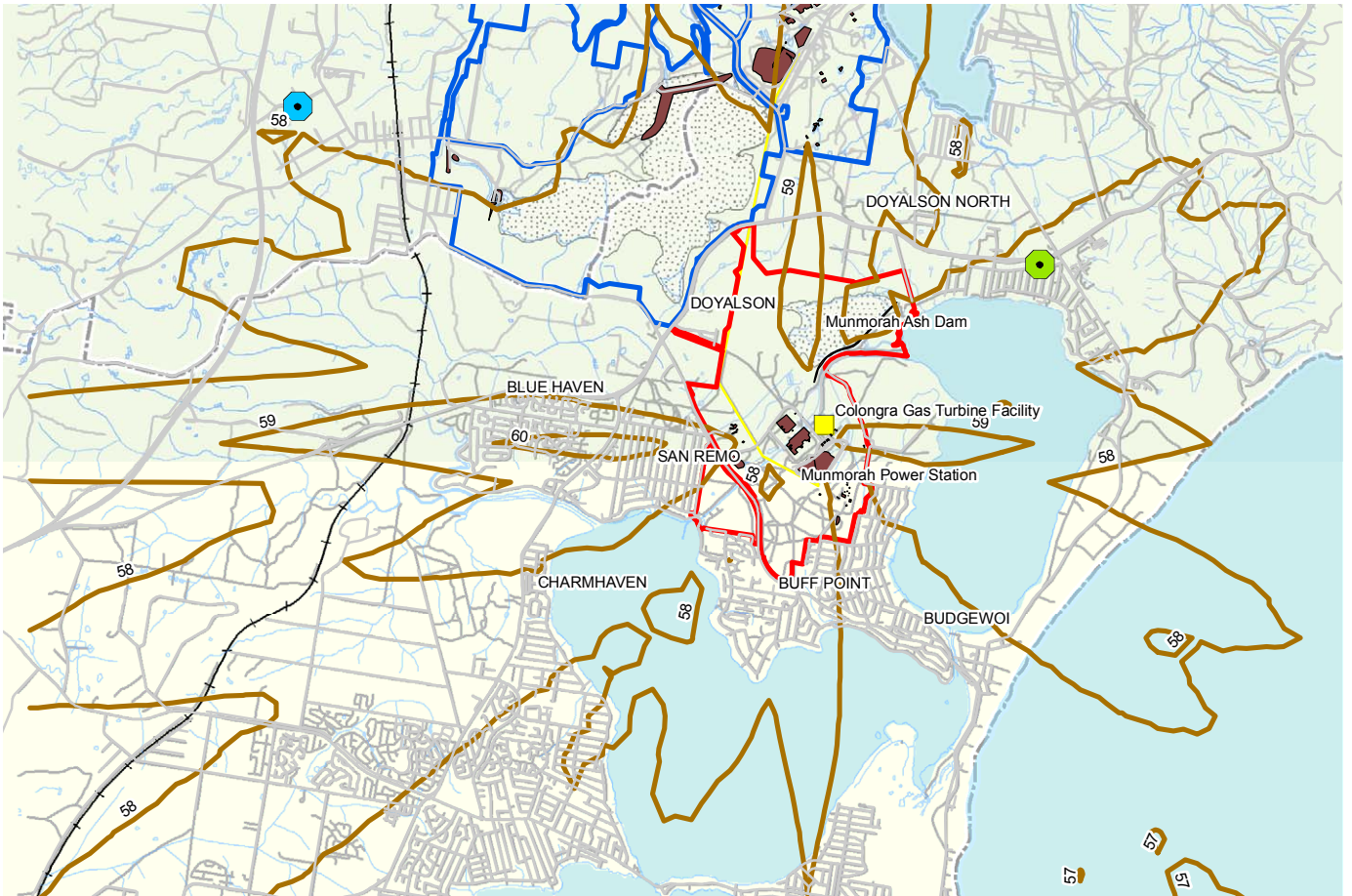


FIGURE 3a: PM10 daily average ground level concentration ($\mu\text{g}/\text{m}^3$)

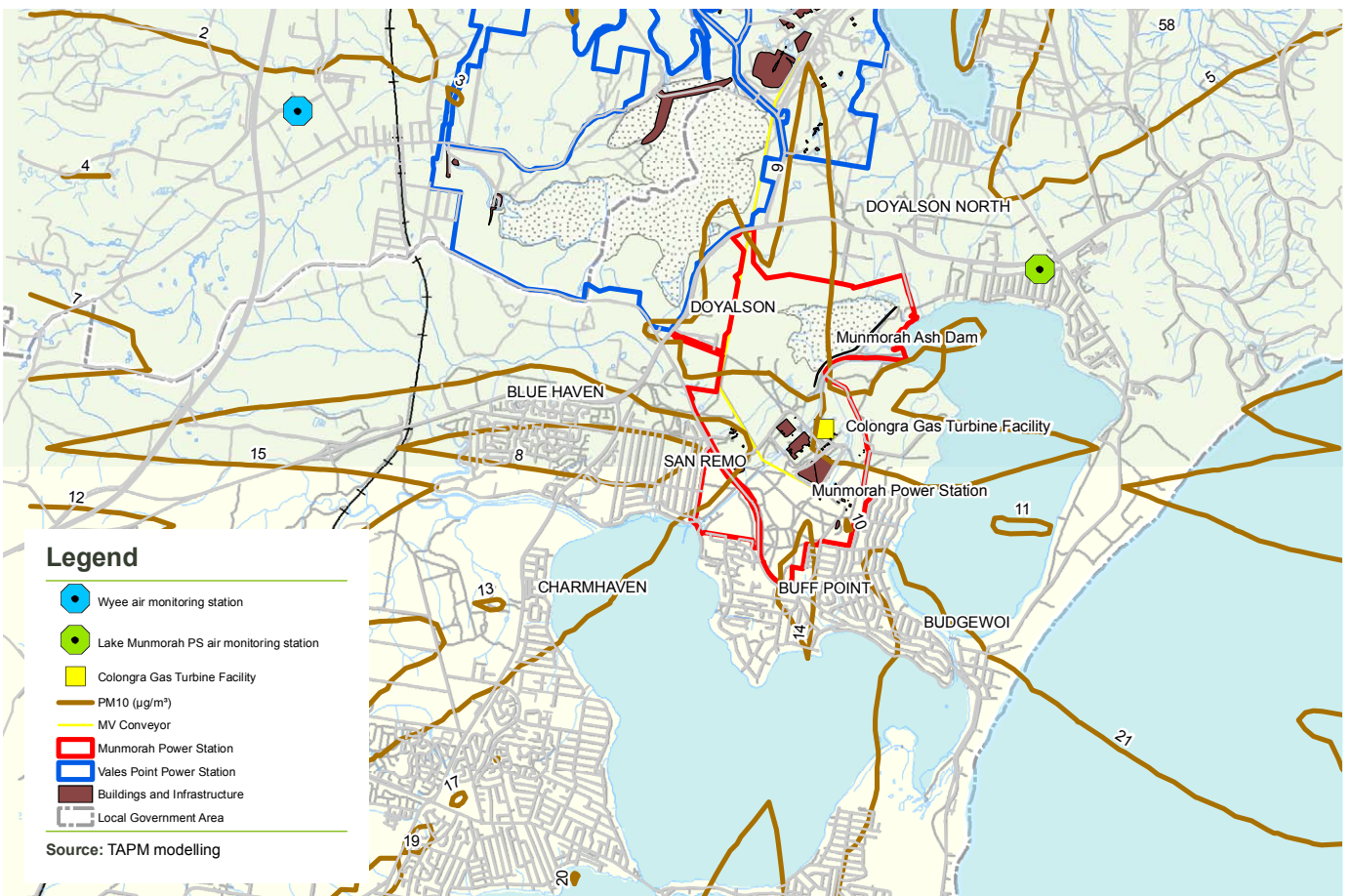
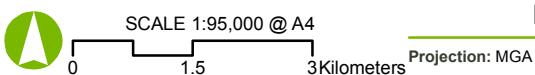


FIGURE 3: PM10 annual average ground level concentration ($\mu\text{g}/\text{m}^3$)





Attachment C

Distribution of observed SO₂ peak to mean ratios
(Holmes Air Sciences, 2005)



Peak-to-mean (10 to 60 minute) ratios for SO₂ monitoring in 2003

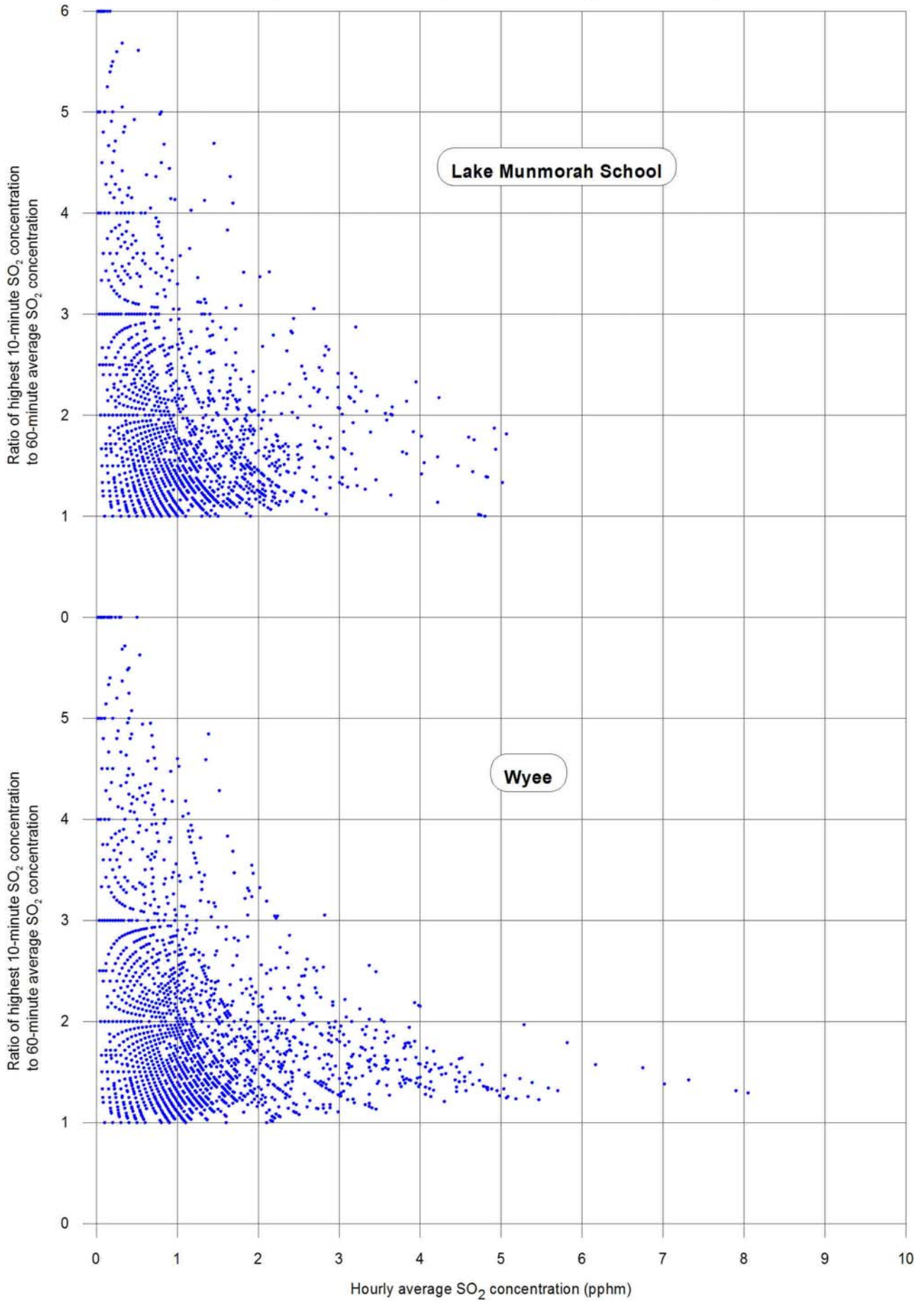


FIGURE 14