

METROPOLITAN COAL - ENVIRONMENTAL MONITORING SUMMARY

Air Quality

The Metropolitan Coal air quality monitoring network consists of the following components:

- ten dust deposition gauges (DG1 to DG10) to monitor monthly dust fall out;
- one High Volume Air Sampler (HVAS) to measure 24 hour average particulate matter less than 10 microns (μm) (PM_{10}) concentrations on a 6-day cycle;
- one Tapered Element Oscillating Microbalance (TEOM) monitor to measure PM_{10} in real-time; and
- one Automatic Weather Station.

The air quality monitoring network is shown on Figure 1 and a summary of the dust deposition and particulate matter monitoring results is provided below.

Deposited Dust

Monthly dust deposition rates are measured at ten dust gauges (DG1 to DG10) (Figure 1) consistent with Environment Protection Licence 767 and the Metropolitan Coal Air Quality and Greenhouse Gas Management Plan. It should be noted that DG4 is a control dust gauge that is located at the Helensburgh Golf Course, some 2 kilometres (km) from the Major Surface Facilities Area. The monthly dust deposition monitoring results for the reporting period are shown in Chart 1.

The high dust deposition results at DG9 and DG10 were recorded in January 2014 as a result of samples from the gauges not being collected in December 2013 (i.e. these results represent a composite of two months data). The next highest record was during January 2014 at DG8. If the mine was a significant contributor to the value recorded at DG8, it would be anticipated that adjacent dust gauges, located closer to the mine boundary (such as DG3 or DG6) would record similar values. This is not the case, with highest dust deposition values recorded at these dust deposition gauges during January 2014 being less than $1.5 \text{ g/m}^2/\text{month}$. It is anticipated that the result represents a local source of contamination, such as plant or animal (i.e. insect) matter.

The annual average dust deposition rate for each site for the reporting period is presented in Table 1 and in Chart 2. The annual average dust deposition rate over the whole network was $1.2 \text{ grams per square metre per month (g/m}^2/\text{month)}$.

Table 1
Annual Average Dust Deposition Rates for the Reporting Period

Location	Site ID	Dust Deposition ($\text{g/m}^2/\text{month}$)
136 The Crescent [EPA ID 1]	DG1	0.8
28 Old Station Road [EPA ID 2]	DG2	0.6
Mine Entrance [EPA ID 3]	DG3	2.2
Helensburgh Golf Course [EPA ID 4]	DG4	1.2^1
83 Parkes Street [EPA ID 5]	DG5	0.8
55 Parkes Street (moved to 59 Parkes Street in November 2014) [EPA ID 11]	DG6	0.6^2
32 Old Station Road [EPA ID 12]	DG7	0.9
88 Parkes Street [EPA ID 13]	DG8	2.4
Helensburgh Public School [EPA ID 14]	DG9	2.0^3
Helensburgh Private School [EPA ID 15]	DG10	0.9^4

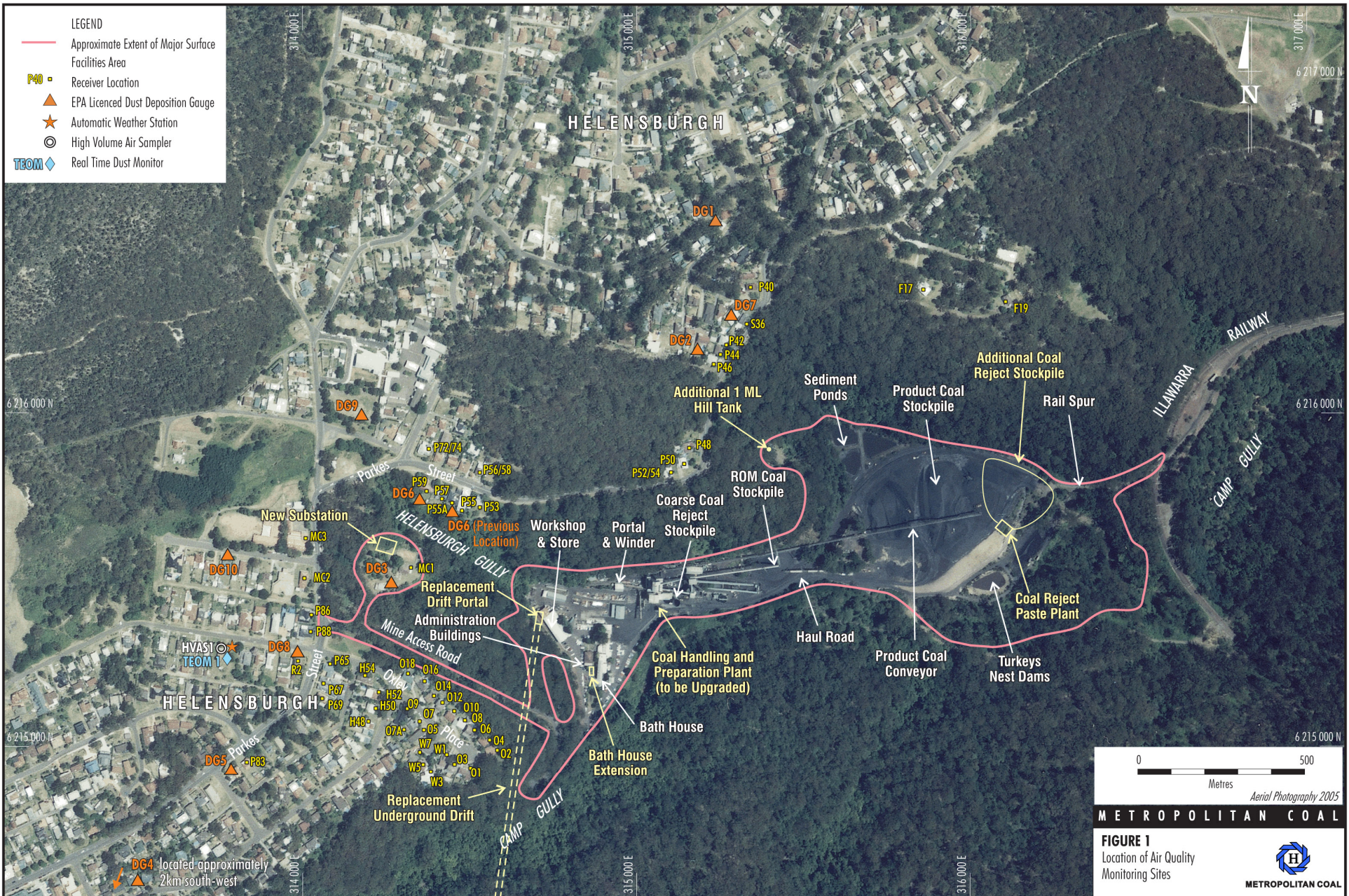
¹ DG4 is a control dust gauge that is located at the Helensburgh Golf Course some 2 km from the Major Surface Facilities Area and is not included in the assessment of the dust deposition performance indicator.

² Annual average dust deposition for DG6 has been calculated using the ten months of available data. Samples were unable to be collected at DG6 in September and October 2014 due to a missing dust gauge.

³ Annual average dust deposition for DG9 has been calculated using the available sample results from December 2013 to November 2014 (noting that the January 2014 sample result is a composite of December 2013/January 2014 and that the sample was unable to be collected in December 2014).

⁴ Annual average dust deposition for DG10 has been calculated using the available sample results from December 2013 to December 2014 (noting that the January 2014 sample result is a composite of December 2013/January 2014 and that there is no result available for August 2014 as the dust gauge had been moved from its location).

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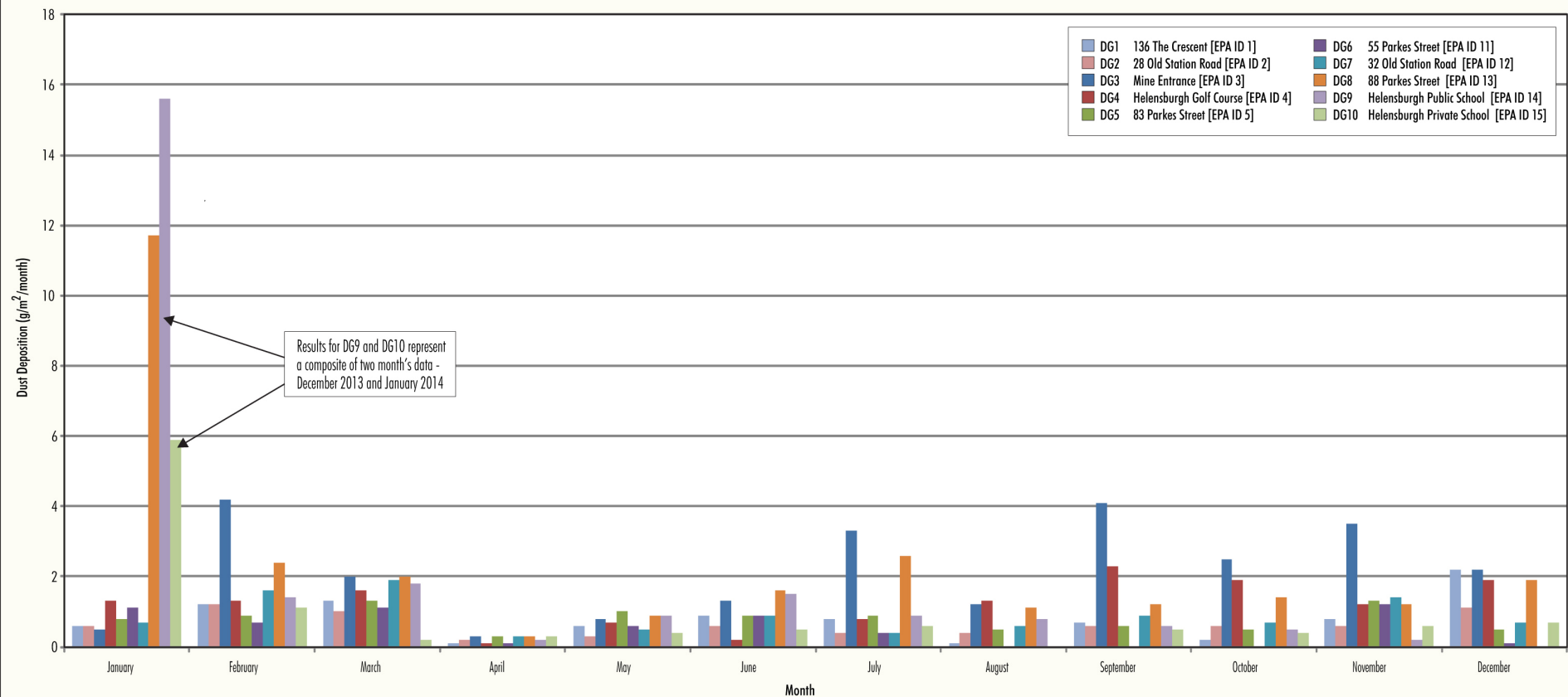


Chart 1 Dust Deposition Monitoring Data January to December 2014

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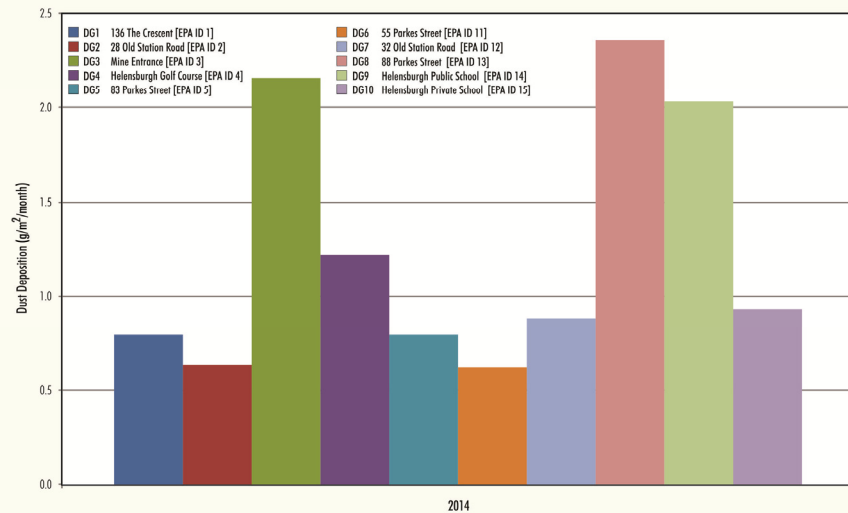


Chart 2 Annual Average Dust Deposition, January to December 2014

Particulate Matter

One TEOM and one HVAS are located near the Metropolitan Coal Mine (Figure 1). The TEOM allows for continuous measurement of PM₁₀ concentrations, at five-minute intervals, while the HVAS provides an average PM₁₀ concentration for a specific 24-hour period, on a six-day cycle. A discussion of PM₁₀ monitoring results obtained by both the TEOM and HVAS is provided below.

Tapered Element Oscillating Microbalance (TEOM)

Chart 3 shows a graph of the 24-hour average PM₁₀ concentrations during the reporting period. The highest 24-hour average PM₁₀ concentration during the reporting period was 34.2 micrograms per cubic metre (µg/m³), recorded on 31 December 2014. The annual average concentration for the 2014 calendar year was 11.8 µg/m³.

The highest 10-minute average PM₁₀ concentration recorded was 98.1 µg/m³.

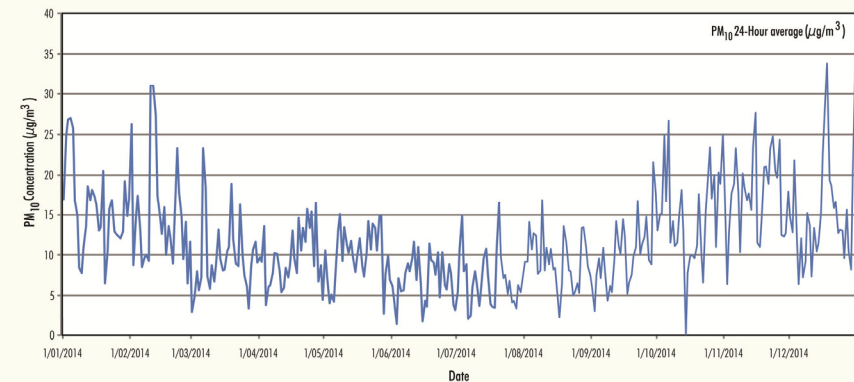


Chart 3 24-Hour Average PM₁₀ Concentration (TEOM), January to December 2014

High Volume Air Sampler

The 24-hour PM₁₀ monitoring results recorded at the HVAS during the reporting period are shown in Chart 4.

The maximum recorded 24-hour average PM₁₀ concentration using the HVAS instrumentation was 23.0 µg/m³ in November 2014. The annual average concentration for the reporting period was 12.6 µg/m³.

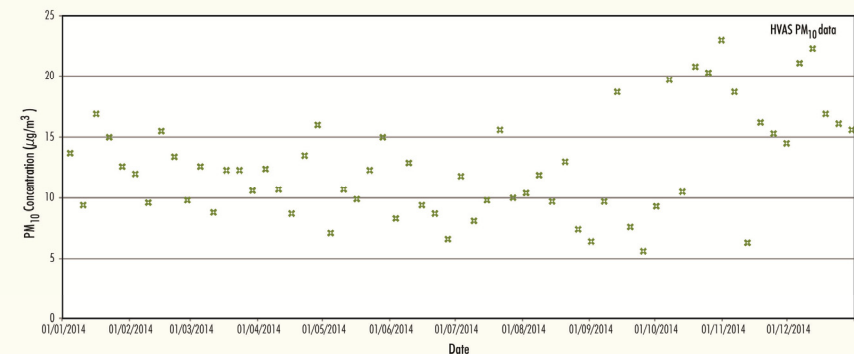


Chart 4 24-Hour Average PM₁₀ Concentration (HVAS), January to December 2014

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Long-term PM₁₀ Analysis

Chart 5 shows the 24-hour average PM₁₀ concentrations from 2007 to 2014. There are two periods where the data is missing, one from 17 March 2009 to 6 April 2009 and another from 28 August 2009 to 28 January 2010 due to maintenance issues. Chart 5 shows that there are elevated measurements (over 50 µg/m³) in the 2009 and 2010 calendar years.

Chart 6 shows the annual average PM₁₀ concentration (measured by HVAS) from 2007 to 2014. The annual average for 2014, while similar in magnitude, is lower than those recorded at this site in previous years.

Assessment of Environmental Performance

An assessment has been conducted against the air quality performance indicators and impact criteria detailed in the Metropolitan Coal Air Quality and Greenhouse Gas Management Plan. The air quality performance indicators are outlined in Table 2 and the air quality impact criteria are outlined in Table 3.

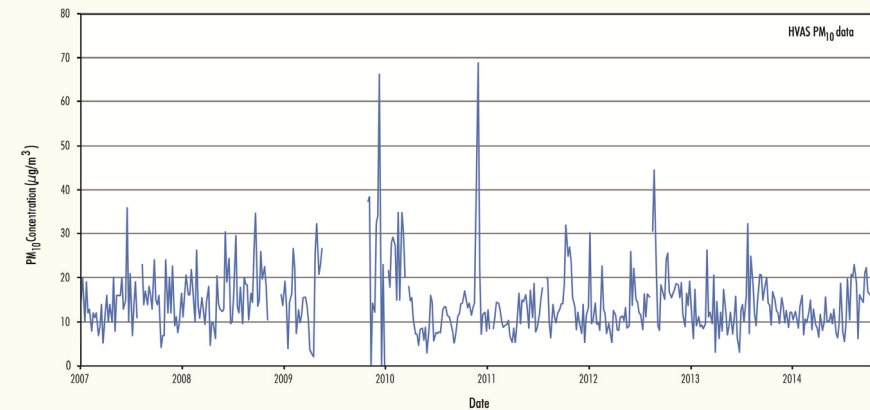


Chart 5 24-Hour Average PM₁₀ Concentration (HVAS), May 2007 to December 2014

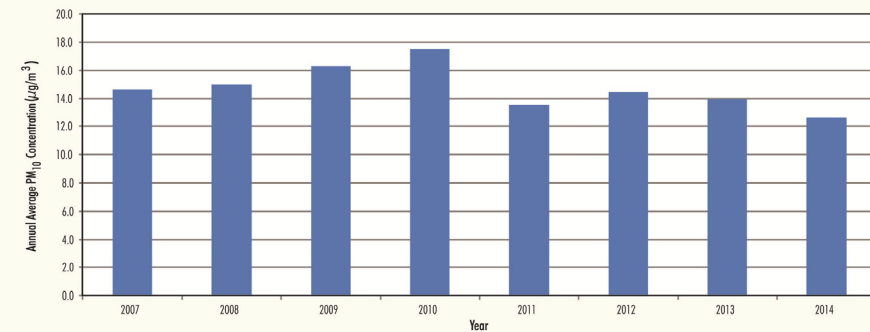


Chart 6 Annual Average PM₁₀ Concentration (HVAS), 2007 to 2014

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Table 2
Air Quality Performance Indicators

Pollutant	Averaging Period	Monitoring Point	Performance Indicator	Performance Indicator Met?	Comments
PM ₁₀	24 hour	HVAS1	37.5 µg/m ³	Yes	Chart 4 indicates there were no exceedances of the PM ₁₀ 24-hour performance indicator of 37.5 µg/m ³ recorded by the HVAS during the reporting period.
	Annual		25 µg/m ³	Yes	Chart 6 indicates the annual average PM ₁₀ concentration measured at the HVAS for the reporting period was 12.6 µg/m ³ , which is lower than the annual average PM ₁₀ performance indicator of 25 µg/m ³ .
	10 minute	TEOM1	150 µg/m ³	Yes	The highest 10 minute average PM ₁₀ concentration measured at the TEOM for the reporting period was 98.1 µg/m ³ , which is lower than the 10-minute average PM ₁₀ performance indicator of 150 µg/m ³ .
	24 hour		37.5 µg/m ³	Yes	Chart 3 indicates there were no exceedances of the PM ₁₀ 24-hour performance indicator of 37.5 µg/m ³ recorded by the TEOM during the reporting period.
Deposited Dust	Annual	Metropolitan Coal Dust Gauges excluding DG4	3 g/m ² /month	Yes	The annual average dust deposition rates for each site indicate that compliance with the deposited dust performance indicator (3 g/m ² /month) was achieved during the reporting period (Table 1 and Chart 2).

Table 3
Air Quality Impact Assessment Criteria

Pollutant	Averaging Period	Criterion ²	Criterion Met?	Comments
TSP ¹	Annual	90 µg/m ³	Yes	Annual average TSP concentrations can be estimated from the PM ₁₀ measurements by assuming that 40-50% of the TSP is comprised of PM ₁₀ . This relationship generally applies across the majority of airsheds, and has been validated through data collected by co-located TSP and PM ₁₀ monitors. Use of this relationship indicates that the annual average TSP concentration for the 2014 calendar year is anticipated to be less than 31.5 µg/m ³ , well below the PM ₁₀ air quality impact assessment criterion of 90 µg/m ³ .
PM ₁₀	Annual	30 µg/m ³	Yes	The HVAS recorded an annual average PM ₁₀ value of 12.6 µg/m ³ for the reporting period, well below the annual average PM ₁₀ air quality impact assessment criterion of 30 µg/m ³ (Chart 6).
	24 hour	50 µg/m ³	Yes	The maximum recorded 24-hour average PM ₁₀ concentration using the HVAS instrumentation was 23.0 µg/m ³ in November 2014 (Chart 4).
Deposited Dust	Annual	Maximum increase in deposited dust level of 2 g/m ² /month Maximum total deposited dust level of 4 g/m ² /month	Yes	Compliance with the dust deposition impact criteria was achieved during the reporting period. All sites show maximum total deposited dust levels that are well within the long term impact assessment criterion of 4 g/m ² /month (Table 1 and Chart 2).

¹ TSP = Total suspended particulate matter

² PM₁₀ assessment criteria to be measured using HVAS data