



Suburban Rail Loop East Early Works Air Quality Monthly Report

18 August – 17 September 2023



Box Hill

Burwood

Glen Waverley

Monash

Clayton

Cheltenham

Stabling facility

Document Information

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Executive Summary

This report presents the results of the monthly review of the air quality monitoring data for each Suburban Rail Loop East Early Works construction site for the period between 18 August 2023 and 17 September 2023 in accordance with Suburban Rail Loop (SRL) East Environmental Management Framework and Environmental Performance Requirements (EPRs) AQ1 and AQ2.

No works requiring monitoring (i.e Early Works) occurred at the following locations during this period:

- Glen Waverley
- Monash
- Clayton
- Heatherton
- Cheltenham.

The key findings are summarised in Table 1.

Table 1: Summary of air quality monitoring results for reporting period.

Location	Parameter	Averaging Period	Max concentration ($\mu\text{g}/\text{m}^3$)	EPA Air Quality Objective ($\mu\text{g}/\text{m}^3$)	Total exceedances in period	Exceedances due to Project Activities
Representative Background	PM ₁₀	24-hour	Data not available due to EPA monitors being offline	50	-	0
Box Hill – Site Office	PM ₁₀	24-hour	71.3 ¹	50	5	4
Box Hill – East of Market St	PM ₁₀	24-hour	233.2	50	2	1
Burwood – 16 McComas Gr	PM ₁₀	24-hour	11.2 ¹	50	0	0
Burwood – Cnr McComas Gr and Sinnott St	PM ₁₀	24-hour	46.5	50	0	0

EPA air quality criteria were met consistently throughout the reporting period, with the exception of five exceedances recorded attributable to Project activities.

On five occasions during this reporting period, the air quality at Box Hill exceeded the EPA air quality objective of 50 $\mu\text{g}/\text{m}^3$ over a 24-hour period. Four Level 3 responses, as defined in the MC's Trigger Action Response Protocol (TARP), were triggered at Box Hill, caused by earthwork activities on 2, 4, 15 and 16 September 2023. The water cart and street sweeper were periodically deployed throughout the site to mitigate dust impacts. Air quality returned to normal levels following the conclusion of earthwork activities.

Additionally, two PM₁₀ concentration results above the EPA air quality objective were recorded on 28 August 2023. These events were caused by heavy fog conditions between the hours of 5:00 AM and 8:00 AM and are not a construction-related exceedance.

¹ Monitoring location during this period has missing data; only four days of data available. See Section 4.1.

Glossary

$\mu\text{g}/\text{m}^3$ – micrograms per cubic metre is a unit of measurement used to measure the mass of air pollutants (micrograms) per volume of air (cubic metre) as a concentration.

Environment Effects Statement (EES) – In Victoria, environment assessment of the potential environmental impacts or effects of a proposed development under the *Environment Effects Act 1978*.

Environmental Management Framework (EMF) – The purpose of the EMF is to provide a transparent and integrated framework to manage environmental effects of the SRL East Project during construction and operation to achieve acceptable environmental outcomes.

Environmental Reference Standard (ERS) – The ERS is a tool made under the *Environment Protection Act 2017* to identify and assess environmental values, including air quality, in Victoria.

Exceedance – An air quality measurement result caused by the Early Works which exceeds the ambient air quality objectives (as defined in the Environment Reference Standard).

PM₁₀ – Particulate matter with an aerodynamic diameter of 10 micrometres (μm) or less. PM₁₀ particles are small enough to have a potential impact on human health.

Trigger Action Response Protocol (TARP) – The TARP defines a series of adaptive management measures that are implemented to avoid or mitigate impacts from dust emissions for nearby sensitive receptors in response to the results from monitoring. The TARP is an element of the Environmental Air Pollution and Dust Management Plan (EAPDMP), which has been verified by the Independent Environmental Auditor.

1. Introduction

1.1. Suburban Rail Loop East

Suburban Rail Loop (SRL) will deliver a 90km rail line linking every major suburban line from the Frankston Line to the Werribee Line via Melbourne Airport, better connecting Victorians to jobs, retail, education, health services and each other. SRL East from Cheltenham to Box Hill will connect major employment, health, education and retail destinations in Melbourne's east and south-east. The new underground train line will reduce travel times, connect people travelling on the Gippsland corridor and building it will create up to 8000 direct local jobs. Trains will be running by 2035.

Early Works for SRL East commenced at Burwood in May 2023. Laing O'Rourke is delivering the Early Works as Managing Contractor (MC). Early Works include:

- road modifications
- utility relocations
- ground improvement works
- tram terminus works, and
- site preparations for tunnel boring machines.

1.2. Environmental Management Framework

The Environmental Management Framework (EMF) for SRL East (the Project) provides a transparent and integrated framework to manage environmental effects of the Project and includes EPRs that define environmental outcomes that must be achieved during the design, construction, and operation phases of the Project. The EMF is available on the SRL east website at <https://bigbuild.vic.gov.au/library/suburban-rail-loop/planning/srl-east-environmental-management-framework>.

The development of the EMF has been informed by relevant legislation, policy and guidelines, and the specialist impact assessment studies completed for the SRL East Environment Effects Statement (EES) and the Minister's Assessment, dated 5 August 2022.

The EMF requires the MC to develop and implement an Environmental Air Quality and Dust Management Plan (EAQDMP). As part of implementing this document the MC is required to conduct monitoring of PM₁₀ concentrations and measure wind speed and direction at each Early Works construction site and at a representative control site. The EAQDMP also includes the Trigger Action Response Protocol (TARP) which defines a set of triggers that prompt actions on site to reduce dust impacts, and review mitigation measures applied.

The MC regularly reviews the monitoring data at each site, for the purpose of assessing the effectiveness of EAQDMP implementation. The results of the PM₁₀ monitoring for the applicable monthly period are contained in this report and have been made publicly available in accordance with the requirements of the EMF.

2. Air Quality Monitoring

2.1. Context

Maintaining air quality is important for public health, the liveability of our cities and our environment. Overall air quality conditions in Melbourne are good however like all major cities, there are days in each year where the background concentrations of air pollutants are very high. Sometimes these elevated concentrations are due to regional influences such as windblown continental dust, bushfires or hazard reduction burns. Emissions from traffic, home heating, and industrial emissions across Melbourne can also cause high background concentrations, especially when the weather is calm. Environmental Protection Authority (EPA) monitoring stations measure these background levels of pollution that already exist in the air within the surrounding area. The EPA monitoring station at Dandenong is used as the representative control site for Heatherton and Cheltenham, and the EPA monitoring station at Box Hill is used as the representative control site for all other SRL work sites.

Without effective management, construction of the Project has the potential to contribute to these background concentrations which may impact public health. Comparison of SRL East monitoring results with publicly available EPA monitoring data can help the contractor identify when construction-related activities are impacting local air quality, and conversely when the local air quality results may be influenced by background conditions rather than the construction site.

Meteorological conditions such as wind direction and speed can impact on the dispersion of particulates in the air and by monitoring these, contractors can respond when conditions on site change. Having records of wind conditions is also helpful for retrospectively identifying the activity that is causing any elevated dust concentrations.

2.2. Purpose

The purpose of the air quality monitors is to measure the concentration of small particles in the air near the construction site. These particles, known as PM₁₀ have the potential to impact human health. PM₁₀ refers to particles with an aerodynamic diameter of 10 µm or less.

The measured concentrations are compared to air quality objectives that are defined in the Environment Reference Standard (ERS) which is a tool under the Environment Protection Act 2017. The objectives are risk-based concentrations that are not intended to be compliance levels, but they assist the contractor to understand the risk to human health. The ERS sets out the air quality objectives for PM₁₀ which are measured over a day, as reproduced below in Table 2.

Table 2: Ambient air quality objectives for PM₁₀.

Indicator	Air Quality Objective (µg/m ³)	Averaging Period
Particles as PM ₁₀ (maximum concentration)	50	24-hour

The measured concentrations (which include both existing background concentrations and the Project's incremental contribution over a 24-hour period) are presented in Section 3 and compared against the air quality objective. Monitoring is continuous, even when there are no construction-related activities occurring on the site, and periods of time where there are no site activities are classified as 'Out of Hours'. The potential for dust generation from the work sites is much lower when there are no site activities occurring, however dust can still be generated at the work site during "Out of Hours" periods due to wind erosion.

2.3. Monitoring Locations

Air quality monitors are located on or adjacent to the Early Works construction sites, to represent local air quality conditions and in positions that enable the contractor to adequately measure potential impact of works on local sensitive receivers including residents.

The air quality monitors were installed on the following dates at each of the following locations. The location of these monitors is shown on maps in Section 3 of this Report.

Table 3: Air quality monitoring locations active during reporting period.

Monitoring Location	Date Commissioned	Coordinates	Monitoring Parameters	Representative Control Site
Box Hill – Site Office	07 Jul 2023	Latitude: -37.817863° Longitude: 145.12187°	PM ₁₀	Box Hill EPA monitoring station
Box Hill – East of Market St	13 Jul 2023	Latitude -37.818073° Longitude: 145.1232°	PM ₁₀	Box Hill EPA monitoring station
Burwood – Zinfra Fence	18 May 2023	Latitude: -37.851494° Longitude: 145.1116°	PM ₁₀	Box Hill EPA monitoring station
Burwood – Cnr McComas Gr and Sinnott St	18 May 2023	Latitude: - 37.852413° Longitude: 145.11163°	PM ₁₀	Box Hill EPA monitoring station

2.4 Data Limitations and Verification

The following limitations apply to this data:

- Meteorological conditions on site can affect measurements made by monitoring devices. For instance, dust measurements can be impacted by rainfall and/or humidity (with water droplets in the air being mistaken as dust particles). Displaying periods of inclement weather allows reviewers to identify measurements that may have been impacted.

Data are provided in tabular and graphical form in Section 3 to visually present 24-hour averages of PM₁₀ over the monthly period. The data included in this report have been verified by the Managing Contractor and relevant subject matter expert.

3. Results

Data is provided in graphical form, below, to visually present 24-hour averages of PM₁₀ dust concentration over the monthly period for each active construction site. Where results exceed the ambient air quality objectives as presented in Table 2 due to works occurring on the construction sites, they are identified below as “Exceedances” and an analysis is presented for discussion.

3.1. Box Hill

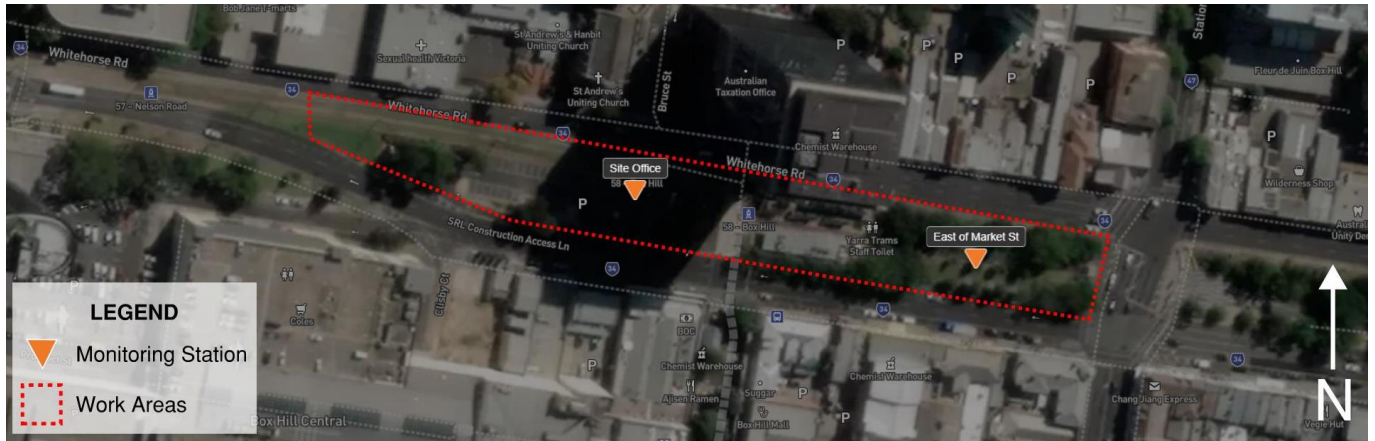


Figure 1: Box Hill air quality monitoring stations.

3.1.1. Results

Table 4: Box Hill PM₁₀ results.

Monitor Number	Monitoring Location	Max Daily PM ₁₀ Concentration (µg/m ³)	EPA Air Quality Objective (µg/m ³)	Total exceedances in period	Exceedances due to Project Activities
-	Representative Background	Data not available	50	N/A	N/A
1	Site Office	71.3	50	5	4
2	East of Market St	233.2	50	2	1

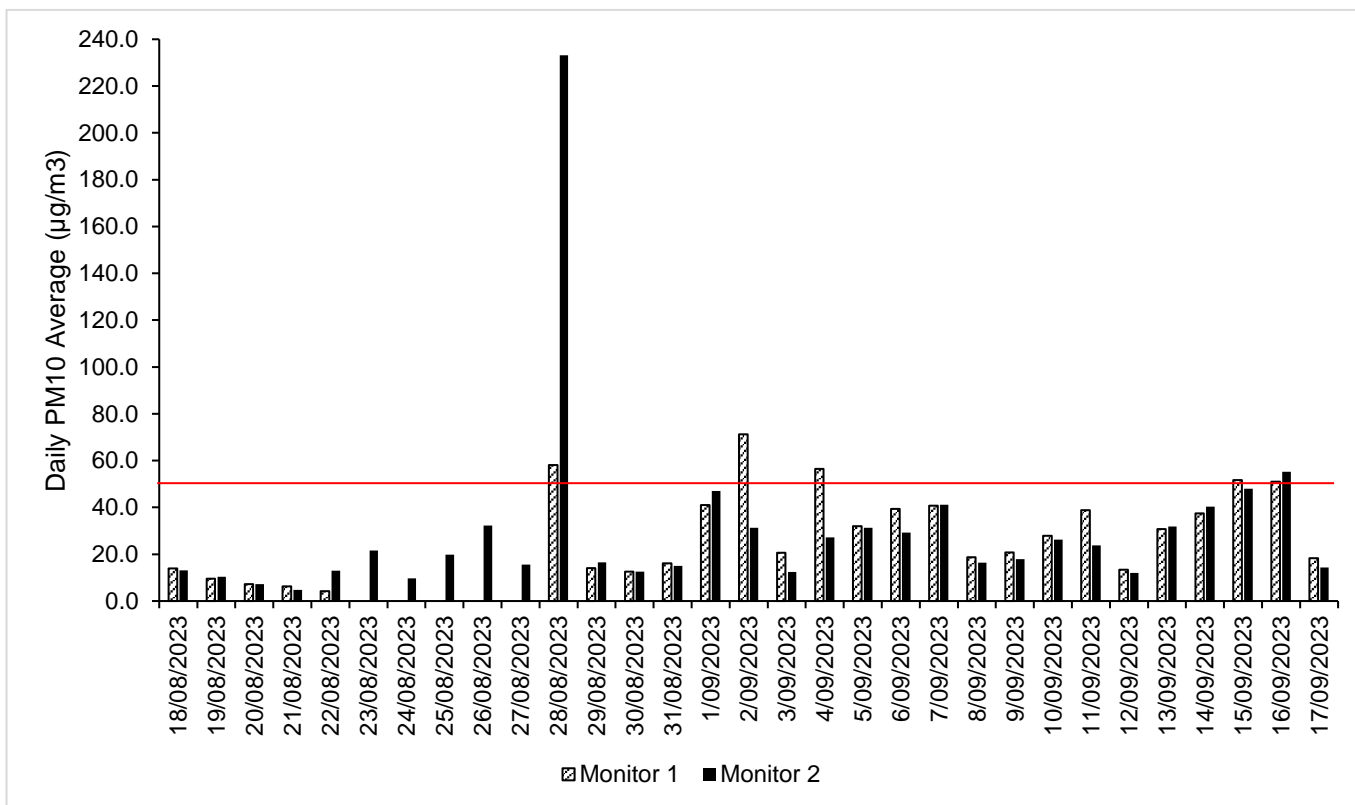


Figure 2: Box Hill PM₁₀ daily averages

3.1.2. Analysis

Over the monitoring period, the Box Hill air quality SiteHive Hexanode monitoring stations recorded maximum daily average PM₁₀ concentrations of 71 µg/m³ (n = 26)² and 233 µg/m³ (n = 31)² at the monitoring stations at the Site Office and east of Market Street, respectively.

Exceedances of the EPA air quality objective (50 µg/m³ over a 24-hour period) were recorded for the dates of 2, 4, 15 and 16 September 2023 for Monitor 1, and on 16 September 2023 for Monitor 2. Bulk earthwork activities were undertaken on 2, 4 and 15 September with piling activities completed on 16 September. High wind speeds (gusts up to 22, 69, 40 and 47 km/h, respectively³) coupled with several days without rain contributed to the generation of airborne dust from site activities. Several consecutive hours of PM₁₀ measurements above 80 µg/m³ across these dates met the criteria of a Level 3 response as defined by the Managing Contractor’s Trigger Action Response Protocol (TARP). Visible dust was not observed to pass the site boundaries and dust impacts were contained to the site. Community complaints were not received regarding outdoor air quality on the days of the exceedances. The water cart and street sweeper were periodically deployed along the haul road located within the Project Boundary along Whitehorse Road to mitigate dust impacts. Air quality returned to normal levels following the conclusion of earthwork and piling activities.

Additionally, high PM₁₀ measurements were recorded on 28 August 2023 for Monitor 1 and Monitor 2. Fog was observed in the morning with the humidity at 9 AM recorded as 93 per cent. As detailed in Section 2.4, water droplets in the air from fog can be recorded as particulate matter (dust). Additionally, the majority of the high readings were recorded between 5:00 and 8:00 AM, prior to commencement of works at the site. As such, the daily average value for 28 August 2023 is not

² n = the number of days of monitoring data captured in the monitoring period

³ Source: <http://www.bom.gov.au/climate/dwo/202309/html/IDCJDW3050.202309.shtml>

considered to be indicative of air quality conditions at the site due to project works and there was no requirement to implement Trigger Action Response Protocol (TARP). This event is not a construction related exceedance.

3.1.3. Meteorological conditions

Table 5: Daily weather observations for Melbourne (Olympic Park), Victoria August 18 – September 17 2023. Data Source BOM.

	Temperature		Daily Rain Total	Maximum Wind Gust		Relative Humidity @ 9:00 AM
	Min (°C)	Max (°C)	mm	Dir	Speed (km/h)	%
Mean	9.5	18.2				67.90
Lowest	3.9	11.7	0	SSW	68	39
Highest	15.1	25.1	5.4	NNW	70	100
Total			26.6			

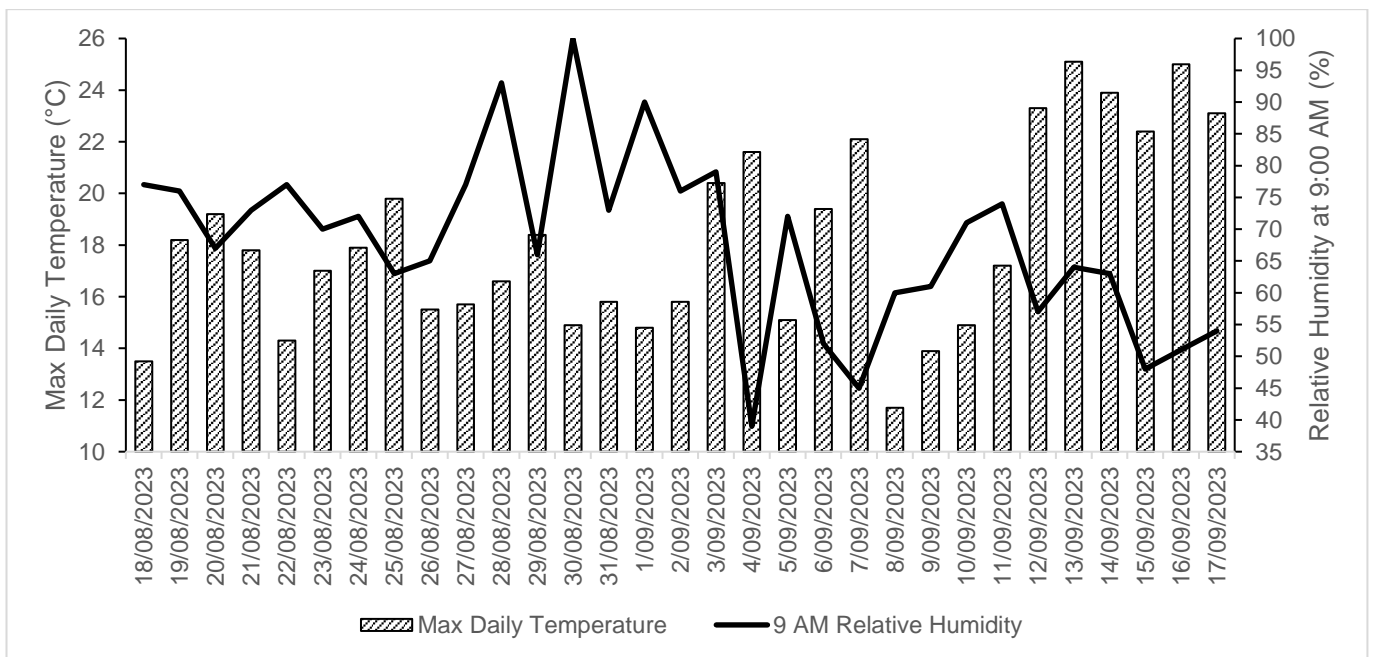


Figure 3: Daily relative humidity and temperature observations for Melbourne (Olympic Park), Victoria August 18 – September 17 2023. Data Source BOM.

3.2. Burwood

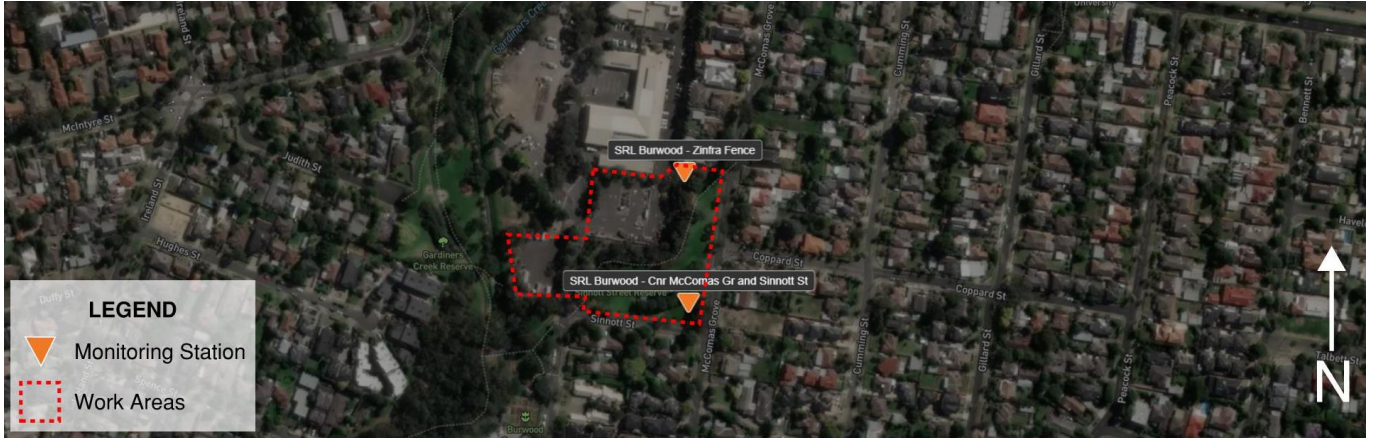


Figure 4: Burwood air quality monitoring stations.

3.2.1. Results

Table 6: Burwood air quality monitor PM10 percentiles

Monitor Number	Monitoring Location	Max Daily PM ₁₀ Concentration (µg/m ³)	EPA Air Quality Objective (µg/m ³)	Exceedances due to Project Activities
-	Representative Background	Data not available	50	0
1	16 McComas Grove	11.2	50	0
2	Corner of McComas Grove and Sinnott Street	46.5	50	0

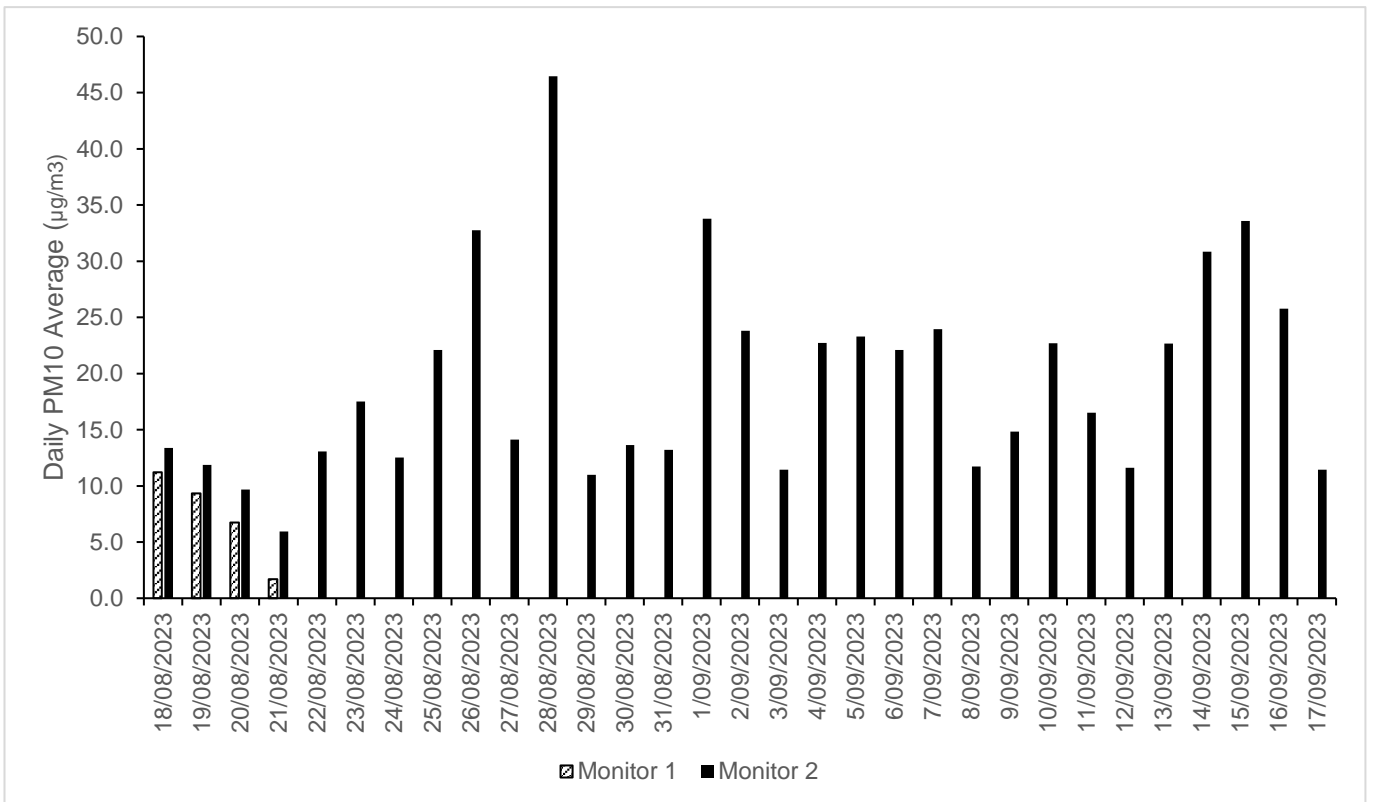


Figure 3: Air quality concentration (24 hour average), Burwood

3.2.2. Analysis

Over the monitoring period, the Burwood air quality SiteHive Hexanode monitoring stations recorded maximum daily average PM₁₀ concentrations of 11.2 µg/m³ (n = 31)⁴ and 46.5 µg/m³ (n = 4) at the monitoring stations at the corner of Sinnott Street and McComas Grove and at the north-eastern corner of the site at 16 McComas Grove, respectively. Note that the measurement from Monitor 1 may not be representative of the site conditions as it was not active for the duration of the monitoring period (see 4.1).

Exceedances of the EPA Air Quality Objective (cumulative total of 50 µg/m³ of PM₁₀ over a 24 hour period) were not observed over the monitoring period. There was no requirement to implement Trigger Action Response Protocol (TARP). The results for the monitoring period show dust levels were within the air quality objective values.

3.2.3. Meteorological conditions

Background air quality was captured from the Melbourne (Olympic Park) BOM weather station. See Section 3.1 for tabulated meteorological data for this reporting period.

4. Quality assurance

4.1. Data capture

Data capture is defined as the number of valid data periods collected divided by the number of available data periods. Valid data excludes period where the instrument is unavailable due to calibration and maintenance and excludes periods where the data has been rejected due to quality assurance/data validation procedures.

Data capture statistics for the reporting period 18 August 2023 to 17 September 2023 are shown in Table 7, below.

Data capture statistics were 100% for all parameters at all stations for the reporting period, with the exception of the following:

- Box Hill Monitor 1 (Site Office) – The monitor was not functional between 23 August 2023 and 27 August 2023 due to a hardware issues which was resolved with technical support from the supplier.
- Burwood Monitor 1 (16 McComas Grove) – This monitor was stolen on 21 August 2023. A replacement monitor is being procured.

Table 7: Air quality monitoring, data capture summary

Location	Parameter	Averaging Period	Collected Periods	Available Periods	Data Capture
Box Hill – Site Office	PM ₁₀	24-hours	26	31	84%
Box Hill – East of Market St	PM ₁₀	24-hours	31	31	100%
Burwood – 16 McComas Gr	PM ₁₀	24-hours	4	31	13%
Burwood – Cnr McComas Gr and Sinnott St	PM ₁₀	24-hours	31	31	100%

⁴ n = the number of days of monitoring data captured in the monitoring period

4.2. Data validation

Data contained in this report has been validated against performance and calibration requirements for each instrument. Data during commissioning, maintenance and calibration periods has been removed from the validated data sets.

Table 8: Monitoring device calibration information.

Location	Device Serial Number	Calibration Date	Calibration Due
Box Hill – Site Office	HEX-000248	01 Jun 2023	01 Jun 2025
Box Hill – East of Market St	HEX-000339	19 Apr 2023	19 Apr 2025
Burwood – 16 McComas Grove	HEX-000385	29 Aug 2023	29 Aug 2025
Burwood – Cnr McComas Gr and Sinnott St	HEX-000308	03 Apr 2023	03 Apr 2025