



OUR REF: 803400.140429  
YOUR REF: Email 200831/JH-RP

18 May 2021

Justin Hazelbrook  
Community and Conditions Coordinator  
PO Box 6008  
Silverwater, NSW 2128

**RE: Report on Ambient Air Quality Above-Limit Reading – 27 and 30 April 2021 (PM<sub>2.5</sub>), and 3 and 4 May 2021 (PM<sub>2.5</sub>)**

Dear Justin,

SNC-Lavalin Australia have been appointed by Fulton Hogan EGIS OM (FHEOM) Joint Venture to perform the Independent Air quality specialist roles and were approved by the NSW Department of Environment and Planning (DPE) on 14 May 2019.

The SNC-L Environment team have prepared and reviewed the report on the Ambient Air Quality Above-Goal Reading Notifications dated 27 and 30 April 2021, and 3 and 4 May 2021 to address the requirements under the Minister's Condition of Approval (MCoA) E12.

Condition E12 states:

*“Within 20 working days of any Notification of Above-Goal Reading, the Proponent must prepare and submit to the Secretary a Report on Above-Goal Reading that details the cause and major contributor of the exceedance and the options available to prevent recurrence.*

*Where the operation of the tunnel is identified to be a significant contributor to the recorded above-goal reading, the Report on Above-Goal Reading must include consideration of improvements to the tunnel air quality management system so as to achieve compliance with the ambient air quality goals, including but not limited to installation of the additional ventilation management facilities allowed for under condition B5, and discussion of whether those improvements are feasible and reasonable...”*

The Ambient Air Quality Above-Goal Reading Report has been prepared following the notifications provided by the Proponent of the Above-Goal Readings that were recorded at the all six monitoring stations for PM<sub>2.5</sub> on 27, 30 April, and 4 May 2021, and Haberfield Public School and Powells Creek monitoring stations for PM<sub>2.5</sub> on 3 May 2021.

The SNC-L Environment team have prepared the report based on the information provided by FHEOM who confirmed that during the period when the exceedances occurred, the tunnel was operating normally. Publicly available information and monitoring data was also reviewed when determining the likely cause and major contributor of the Above-Goal Reading which included long and short term monitoring trends for ambient, in-tunnel and ventilation outlet air quality for the M4 East tunnel, air quality data from the NSW Government Environment, Energy and Science Group



monitoring stations as well as alerts issued by the NSW Rural Fire Service. The review noted that all ventilation outlet monitoring data complied with the relevant criteria during the period. The review concluded that hazard reduction burns being undertaken, most likely impacted air quality causing the Allen Street, Cintra Park, Haberfield Public School, Powells Creek, Ramsay Street and St Lukes Park monitoring stations to record 24hr average  $PM_{2.5}$  values above goal levels. It is therefore highly unlikely that the operation of the tunnel was the cause or major contributor to the Above-Goal Reading and no actions are recommended. The cause and major contributor of the exceedances is the exceptional event as noted above and that no further actions are required by the proponent in relation to these exceedances.

Yours sincerely,

**SNC-LAVALIN AUSTRALIA PTY LTD**



**Richard Peterson**

Associate

*Environment & Geoscience*  
**Infrastructure**



Ambient Monitoring Reporting

<b>Report on Above-Goal Reading</b> WestConnex M4 East To be submitted to DPIE within 20 days of the Report of Above-Goal Reading	
<p><b>Details of the Above-Goal Reading</b></p> <p>Attach relevant Notification of Above-Goal Reading</p>	<p>This report has been prepared to address the requirements under MCoA E12: “Within 20 working days of any Notification of Above-Goal Reading, the Proponent must prepare and submit to the Secretary a Report on Above-Goal Reading that details the cause and major contributor of the exceedance and the options available to prevent recurrence.</p> <p>Where the operation of the tunnel is identified to be a significant contributor to the recorded Above-Goal Reading, the Report on Above-Goal Reading must include consideration of improvements to the tunnel air quality management system so as to achieve compliance with the ambient air quality goals, including but not limited to installation of the additional ventilation management facilities allowed for under condition B5, and discussion of whether those improvements are feasible and reasonable.</p> <p>The Proponent must comply with any requirements arising from the Secretary’s review of the Report on Above-Goal Reading.</p> <p>PM<sub>2.5</sub> – 24-hour average reading with a goal limit of 25 µg/m<sup>3</sup> was reported with an Above-Goal Reading on 27 April 2021 at the following monitoring stations:</p> <ul style="list-style-type: none"> <li>• <b>Allen Street</b> - PM<sub>2.5</sub> – 24-hour average reading of 27.0 µg/m<sup>3</sup></li> <li>• <b>Cintra Park</b> – PM<sub>2.5</sub> – 24-hour average reading of 28.9 µg/m<sup>3</sup></li> <li>• <b>Haberfield Public School</b> – PM<sub>2.5</sub> – 24-hour average reading of 26.2 µg/m<sup>3</sup></li> <li>• <b>Powells Creek</b> – PM<sub>2.5</sub> – 24-hour average reading of 29.5µg/m<sup>3</sup></li> <li>• <b>Ramsay Street</b> – PM<sub>2.5</sub> – 24-hour average reading of 26.5 µg/m<sup>3</sup></li> <li>• <b>St. Lukes Park</b> – 24-hour average reading of 27.0 µg/m<sup>3</sup></li> </ul> <p>PM<sub>2.5</sub> – 24-hour average reading with a goal limit of 25 µg/m<sup>3</sup> was reported with an Above-Goal Reading on 30 April 2021 at the following monitoring stations:</p> <ul style="list-style-type: none"> <li>• <b>Allen Street</b> - PM<sub>2.5</sub> – 24-hour average reading of 26.0 µg/m<sup>3</sup></li> <li>• <b>Cintra Park</b> – PM<sub>2.5</sub> – 24-hour average reading of 30.2 µg/m<sup>3</sup></li> <li>• <b>Haberfield Public School</b> – PM<sub>2.5</sub> – 24-hour average reading of 27.7 µg/m<sup>3</sup></li> <li>• <b>Powells Creek</b> – PM<sub>2.5</sub> – 24-hour average reading of 29.3 µg/m<sup>3</sup></li> <li>• <b>Ramsay Street</b> – PM<sub>2.5</sub> – 24-hour average reading of 27.2 µg/m<sup>3</sup></li> <li>• <b>St. Lukes Park</b> – 24-hour average reading of 25.1 µg/m<sup>3</sup></li> </ul> <p>PM<sub>2.5</sub> – 24-hour average reading with a goal limit of 25 µg/m<sup>3</sup> was reported with an Above-Goal Reading on 3 May 2021 at the following monitoring stations:</p> <ul style="list-style-type: none"> <li>• <b>Haberfield Public School</b> – PM<sub>2.5</sub> – 24-hour average reading of 25.8 µg/m<sup>3</sup></li> <li>• <b>Powells Creek</b> – PM<sub>2.5</sub> – 24-hour average reading of 27.8 µg/m<sup>3</sup></li> </ul> <p>PM<sub>2.5</sub> – 24-hour average reading with a goal limit of 25 µg/m<sup>3</sup> was reported with an Above-Goal Reading on 4 May 2021 at the following monitoring stations:</p> <ul style="list-style-type: none"> <li>• <b>Allen Street</b> - PM<sub>2.5</sub> – 24-hour average reading of 32.0 µg/m<sup>3</sup></li> <li>• <b>Cintra Park</b> – PM<sub>2.5</sub> – 24-hour average reading of 33.8 µg/m<sup>3</sup></li> <li>• <b>Haberfield Public School</b> – PM<sub>2.5</sub> – 24-hour average reading of 31.0 µg/m<sup>3</sup></li> <li>• <b>Powells Creek</b> – PM<sub>2.5</sub> – 24-hour average reading of 31.9 µg/m<sup>3</sup></li> <li>• <b>Ramsay Street</b> – PM<sub>2.5</sub> – 24-hour average reading of 29.9 µg/m<sup>3</sup></li> <li>• <b>St. Lukes Park</b> – 24-hour average reading of 30.2µg/m<sup>3</sup></li> </ul> <p>The immediate notification of the ambient air quality Above-Goal Reading has been issued to Secretary, EPA, and NSW Health. (refer to Section 1 of this report)</p>
<p><b>Was the data valid?</b></p> <p>If invalid, include any details or justifications for the invalidity</p>	<p>The data has not yet been validated.</p>
<p><b>Comparison with long term monitoring trends and background air quality data</b></p> <p>This is not required to be completed, however if available and</p>	<p>Long term trends for PM<sub>2.5</sub> levels are consistently between 5-20 µg/m<sup>3</sup> at all six of the monitored ambient air quality monitoring stations around the M4 tunnels.</p> <p>NSW RFS have confirmed that multiple planned hazard reduction fires were taking place between April to May 2021, with smoke warnings issued for the Greater Sydney region.</p> <p>Elevated levels of PM<sub>2.5</sub>, at the six monitoring stations, are evident on 27 and 30 April 2021, and 3 and 4 May 2021, due to the impact of smoke from multiple planned hazard reduction fires across NSW during this period.</p>
<p><b>Cause or major contributor of the Above-Goal Reading</b></p>	<p>It may be concluded that the Above-Goal Readings recorded at Allen Street, Cintra Park, Haberfield Public School, Powells Creek, Ramsay Street and St. Lukes Park</p>

<p>If the cause or major contributor are not able to be determined, then known facts of what was occurring at the time should be included (eg traffic information, ventilation outlet monitoring records etc)</p>	<p>monitoring stations were likely to be attributed to an external event, and not due to the operation of the tunnel ventilation system.</p> <p>The data collected from the EES Group air quality monitoring stations across Sydney is consistent with the readings from the WestConnex M4 East ambient air quality monitoring stations located near the tunnel. Furthermore, the images from NSW RFS' Twitter page shows hazard reduction burns were undertaken on the same days as the Above-Goal Reading notifications from the M4 East ambient air quality stations.</p> <p>In addition, the diagrams in Section 2.7 and 2.8 demonstrate that all ventilation outlet and in-tunnel monitoring results for the same period were below the specified goals. Therefore, it is unlikely that events or emissions associated with the operation of the M4 East Tunnel were a cause or major contributor of the recorded exceedances.</p>	
<p><b>Options to prevent recurrence</b></p> <p>This is to include consideration of improvements to the tunnel air quality management system so as to achieve compliance with the ambient air quality goals, including but not limited to installation of the additional ventilation management facilities allowed for under condition B5, and discussion of whether those improvements are feasible and reasonable</p>		
<p>It has been identified that the most likely cause or major contributor to the exceedance of the Above-Goal Readings was an external event(s) relating to hazard reduction burning carried out by NSW RFS.</p>		
<p><b>Person responsible for report</b></p>	<p>Name</p>	<p>Peter Redwin</p>
	<p>Position</p>	<p>Head of Operations and Maintenance</p>
	<p>Organisation</p>	<p>WestConnex Transurban</p>
	<p>Date</p>	

# Contents

- 1. Ambient Above-Goal Reading Notifications ..... 4**
  - 1.1 27 April 2021 ..... 4
  - 1.2 30 April 2021 ..... 5
  - 1.3 3 May 2021..... 6
  - 1.4 4 May 2021..... 7
- 2. Air Quality Monitoring Results ..... 8**
  - 2.1 Ambient Air Quality Data from June 2020 – May 2021 ..... 8
  - 2.2 Ambient Air Quality Data for Previous Month ..... 8
  - 2.3 27 April 2021 PM<sub>2.5</sub> - 24 Hour Average Data at All Monitoring Stations ..... 9
  - 2.4 30 April 2021 PM<sub>2.5</sub> - 24 Hour Average Data at All Monitoring Stations ..... 9
  - 2.5 3 May 2021 PM<sub>2.5</sub> - 24 Hour Average Data at All Monitoring Stations ..... 10
  - 2.6 4 May 2021 PM<sub>2.5</sub> - 24 Hour Average Data at All Monitoring Stations ..... 10
  - 2.7 Solid Particles – 1 Hour Average Data Values from Ventilation Outlet Monitoring Equipment  
11
  - 2.8 Visibility – 15 Minute Maximum Data Values from In-Tunnel Monitoring Equipment ..... 11
- 3. Background..... 12**
  - 3.1 Monitoring Stations ..... 12
  - 3.2 Ambient Air Quality Goals ..... 12
  - 3.3 Validation of Data ..... 13
  - 3.4 Exceptional Events..... 13
- 4. Events Report ..... 14**
  - 4.1 Investigation of Event..... 14
  - 4.2 Additional Data..... 15
    - 4.2.1 Environment, Energy and Science Group..... 15
    - 4.2.2 Bureau of Meteorology ..... 19
    - 4.2.3 News and Media Release ..... 20
- 5. Findings ..... 27**
- 6. Conclusion ..... 28**

# 1. Ambient Above-Goal Reading Notifications

## 1.1 27 April 2021

<b>Notification of Ambient above-goal reading</b> WestConnex M4 East		
To be notified immediately to Project Company and TfNSW. Project Company is to notify DPE, EPA and NSW Health within 24 hours.		
<b>Date</b>	27 April 2021	
<b>Time (start and finish)</b>	0000hrs to 0000hrs	
<b>Relevant location</b>	<input checked="" type="checkbox"/> Allen Street	<input checked="" type="checkbox"/> Powells Creek
	<input checked="" type="checkbox"/> St Lukes Park	<input checked="" type="checkbox"/> Cintra Park
	<input checked="" type="checkbox"/> Haberfield Public School	<input checked="" type="checkbox"/> Ramsay Street
<b>Relevant goal</b>	<input type="checkbox"/> CO – 8 hour rolling average of 9.0 ppm	
	<input type="checkbox"/> NO <sub>2</sub> – One hour average of 0.12 ppm (245 µg/m <sup>3</sup> )	
	<input type="checkbox"/> PM <sub>10</sub> – 24 hour average of 50 µg/m <sup>3</sup>	
	<input checked="" type="checkbox"/> PM <sub>2.5</sub> – 24 hour average of 25 µg/m <sup>3</sup>	
	<input type="checkbox"/> PM <sub>10</sub> – Annual average of 25 µg/m <sup>3</sup>	
	<input type="checkbox"/> PM <sub>2.5</sub> – Annual average of 8 µg/m <sup>3</sup>	
<b>Above-goal reading</b> Detail the above-goal reading that was received	<b>PM<sub>2.5</sub></b> Allen Street: 27.0 µg/m <sup>3</sup> Cintra Park: 28.9 µg/m <sup>3</sup> Haberfield Public School: 26.2 µg/m <sup>3</sup> Powells Creek: 29.5 µg/m <sup>3</sup> Ramsay Street: 26.5 µg/m <sup>3</sup> St. Lukes Park: 27.0 µg/m <sup>3</sup>	
<b>Duration</b> Detail the duration of the above-goal reading or event	24hrs	
<b>Nature of event</b> Detail nature of the event that contributed to the above-goal reading	The elevated PM <sub>2.5</sub> concentrations across the six M4 East ambient monitoring stations are consistent with the Sydney East DPI&E ambient air quality network. NSW RFS have confirmed that planned hazard reduction burning was taking place and had issued a smoke advisory warning for greater Sydney.	
<b>Was the data valid?</b> If unknown at this stage, please indicate. Refer section 5.2.1 of this Protocol.	Data is yet to be validated.	
<b>Was there an emergency?</b> Refer section 3.1 of this Protocol. If this is unknown at this stage, please indicate.	No.	
<b>Measures employed</b> Detail measures employed to minimise the concentration levels	All ventilation outlet and in-tunnel monitoring results for the 27/04/2021 were below the limits specified.	
<b>Commitment to prepare and submit a Report on Above-Goal Reading</b> A Report on Above-Goal Reading will be prepared for this notification. Please note that a Report is not required in the event of an emergency.		
<b>Person responsible for notification</b>	Name: Peter Redwin	
	Position: Head of Operations and Maintenance	
	Organisation: WestConnex Transurban	

## 1.2 30 April 2021

<b>Notification of Ambient above-goal reading</b> WestConnex M4 East		
To be notified immediately to Project Company and TfNSW. Project Company is to notify DPIE, EPA and NSW Health within 24 hours.		
<b>Date</b>	30 April 2021	
<b>Time (start and finish)</b>	0000hrs to 0000hrs	
<b>Relevant location</b>	<input checked="" type="checkbox"/> Allen Street	<input checked="" type="checkbox"/> Powells Creek
	<input checked="" type="checkbox"/> St Lukes Park	<input checked="" type="checkbox"/> Cintra Park
	<input checked="" type="checkbox"/> Haberfield Public School	<input checked="" type="checkbox"/> Ramsay Street
<b>Relevant goal</b>	<input type="checkbox"/> CO – 8 hour rolling average of 9.0 ppm	
	<input type="checkbox"/> NO <sub>2</sub> – One hour average of 0.12 ppm (245 µg/m <sup>3</sup> )	
	<input type="checkbox"/> PM <sub>10</sub> – 24 hour average of 50 µg/m <sup>3</sup>	
	<input checked="" type="checkbox"/> PM <sub>2.5</sub> – 24 hour average of 25 µg/m <sup>3</sup>	
	<input type="checkbox"/> PM <sub>10</sub> – Annual average of 25 µg/m <sup>3</sup>	
	<input type="checkbox"/> PM <sub>2.5</sub> – Annual average of 8 µg/m <sup>3</sup>	
<b>Above-goal reading</b> Detail the above-goal reading that was received	<b>PM<sub>2.5</sub></b> Allen Street: 26.0 µg/m <sup>3</sup> Cintra Park: 30.2 µg/m <sup>3</sup> Haberfield Public School: 27.7 µg/m <sup>3</sup> Powells Creek: 29.3 µg/m <sup>3</sup> Ramsay Street: 27.2 µg/m <sup>3</sup> St. Lukes Park: 25.1 µg/m <sup>3</sup>	
<b>Duration</b> Detail the duration of the above-goal reading or event	24hrs	
<b>Nature of event</b> Detail nature of the event that contributed to the above-goal reading	The elevated PM <sub>2.5</sub> concentrations across the six M4 East ambient monitoring stations are consistent with the Sydney East DPI&E ambient air quality network. NSW RFS have confirmed that planned hazard reduction burning was taking place and had issued a smoke advisory warning for greater Sydney.	
<b>Was the data valid?</b> If unknown at this stage, please indicate. Refer section 5.2.1 of this Protocol.	Data is yet to be validated.	
<b>Was there an emergency?</b> Refer section 3.1 of this Protocol. If this is unknown at this stage, please indicate.	No.	
<b>Measures employed</b> Detail measures employed to minimise the concentration levels	All ventilation outlet and in-tunnel monitoring results for the 30/04/2021 were below the limits specified.	
<b>Commitment to prepare and submit a Report on Above-Goal Reading</b> A Report on Above-Goal Reading will be prepared for this notification. Please note that a Report is not required in the event of an emergency.		
<b>Person responsible for notification</b>	Name: Peter Redwin	
	Position: Head of Operations and Maintenance	
	Organisation: WestConnex Transurban	

### 1.3 3 May 2021

<b>Notification of Ambient above-goal reading</b> WestConnex M4 East	
To be notified Immediately to Project Company and TfNSW. Project Company is to notify DPIE, EPA and NSW Health within 24 hours.	
<b>Date</b>	03 May 2021
<b>Time (start and finish)</b>	0000hrs to 0000hrs
<b>Relevant location</b>	<input type="checkbox"/> Allen Street <input checked="" type="checkbox"/> Powells Creek
	<input type="checkbox"/> St Lukes Park <input type="checkbox"/> Cintra Park
	<input checked="" type="checkbox"/> Haberfield Public School <input type="checkbox"/> Ramsay Street
<b>Relevant goal</b>	<input type="checkbox"/> CO – 8 hour rolling average of 9.0 ppm
	<input type="checkbox"/> NO <sub>2</sub> – One hour average of 0.12 ppm (245 µg/m <sup>3</sup> )
	<input type="checkbox"/> PM <sub>10</sub> – 24 hour average of 50 µg/m <sup>3</sup>
	<input checked="" type="checkbox"/> PM <sub>2.5</sub> – 24 hour average of 25 µg/m <sup>3</sup>
	<input type="checkbox"/> PM <sub>10</sub> – Annual average of 25 µg/m <sup>3</sup>
<input type="checkbox"/> PM <sub>2.5</sub> – Annual average of 8 µg/m <sup>3</sup>	
<b>Above-goal reading</b> Detail the above-goal reading that was received	<b>PM<sub>2.5</sub></b> Haberfield Public School: 25.8 µg/m <sup>3</sup> Powells Creek: 27.8 µg/m <sup>3</sup>
<b>Duration</b> Detail the duration of the above-goal reading or event	24hrs
<b>Nature of event</b> Detail nature of the event that contributed to the above-goal reading	The elevated PM <sub>2.5</sub> concentrations across the M4 East ambient monitoring stations are consistent with the Sydney East DPI&E ambient air quality network. NSW RFS have confirmed that planned hazard reduction burning was taking place and had issued a smoke advisory warning for greater Sydney.
<b>Was the data valid?</b> If unknown at this stage, please indicate. Refer section 5.2.1 of this Protocol.	Data is yet to be validated.
<b>Was there an emergency?</b> Refer section 3.1 of this Protocol. If this is unknown at this stage, please indicate.	No.
<b>Measures employed</b> Detail measures employed to minimise the concentration levels	All ventilation outlet and in-tunnel monitoring results for the 03/05/2021 were below the limits specified.
<b>Commitment to prepare and submit a Report on Above-Goal Reading</b> A Report on Above-Goal Reading will be prepared for this notification. Please note that a Report is not required in the event of an emergency.	
<b>Person responsible for notification</b>	Name: Peter Redwin
	Position: Head of Operations and Maintenance
	Organisation: WestConnex Transurban

## 1.4 4 May 2021

<b>Notification of Ambient above-goal reading</b> WestConnex M4 East	
To be notified immediately to Project Company and TRNSW. Project Company is to notify DPIE, EPA and NSW Health within 24 hours.	
<b>Date</b>	04 May 2021
<b>Time (start and finish)</b>	0000hrs to 0000hrs
<b>Relevant location</b>	<input type="checkbox"/> Allen Street <input checked="" type="checkbox"/> Powells Creek
	<input type="checkbox"/> St Lukes Park <input type="checkbox"/> Cintra Park
	<input checked="" type="checkbox"/> Haberfield Public School <input type="checkbox"/> Ramsay Street
<b>Relevant goal</b>	<input type="checkbox"/> CO – 8 hour rolling average of 9.0 ppm
	<input type="checkbox"/> NO <sub>2</sub> – One hour average of 0.12 ppm (245 µg/m <sup>3</sup> )
	<input type="checkbox"/> PM <sub>10</sub> – 24 hour average of 50 µg/m <sup>3</sup>
	<input checked="" type="checkbox"/> PM <sub>2.5</sub> – 24 hour average of 25 µg/m <sup>3</sup>
	<input type="checkbox"/> PM <sub>10</sub> – Annual average of 25 µg/m <sup>3</sup>
<input type="checkbox"/> PM <sub>2.5</sub> – Annual average of 8 µg/m <sup>3</sup>	
<b>Above-goal reading</b> Detail the above-goal reading that was received	<b>PM<sub>2.5</sub></b> Allen Street: 32.0 µg/m <sup>3</sup> Cintra Park: 33.8 µg/m <sup>3</sup> Haberfield Public School: 31.0 µg/m <sup>3</sup> Powells Creek: 31.9 µg/m <sup>3</sup> Ramsay Street: 29.9 µg/m <sup>3</sup> St. Lukes Park: 30.2 µg/m <sup>3</sup>
<b>Duration</b> Detail the duration of the above-goal reading or event	24hrs
<b>Nature of event</b> Detail nature of the event that contributed to the above-goal reading	The elevated PM <sub>2.5</sub> concentrations across the M4 East ambient monitoring stations are consistent with the Sydney East DPI&E ambient air quality network. NSW RFS have confirmed that planned hazard reduction burning was taking place in Campbelltown, Sutherland, Northern Beaches and the Blue Mountains areas.
<b>Was the data valid?</b> If unknown at this stage, please indicate. Refer section 5.2.1 of this Protocol.	Data is yet to be validated.
<b>Was there an emergency?</b> Refer section 3.1 of this Protocol. If this is unknown at this stage, please indicate.	No.
<b>Measures employed</b> Detail measures employed to minimise the concentration levels	All ventilation outlet and in-tunnel monitoring results for the 03/05/2021 were below the limits specified.
<b>Commitment to prepare and submit a Report on Above-Goal Reading</b> A Report on Above-Goal Reading will be prepared for this notification. Please note that a Report is not required in the event of an emergency.	
<b>Person responsible for notification</b>	Name: Peter Redwin
	Position: Head of Operations and Maintenance
	Organisation: WestConnex Transurban

## 2. Air Quality Monitoring Results

The following diagrams were captured from the official website for the Air Monitoring on M4E (<https://www.linkt.com.au/sydney/using-toll-roads/about-sydney-toll-roads/westconnex-m4/tunnel-air-quality>).

### 2.1 Ambient Air Quality Data from June 2020 – May 2021

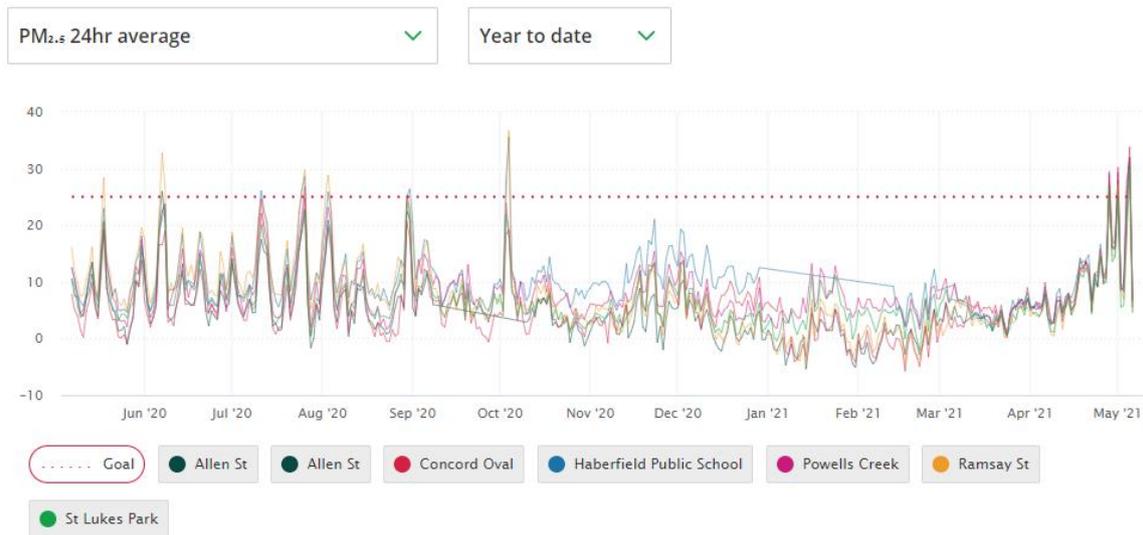


Figure 1: Ambient air quality data for PM<sub>2.5</sub> for all monitoring sites from Jun 2020 to date (6 May 2021).

### 2.2 Ambient Air Quality Data for Previous Month

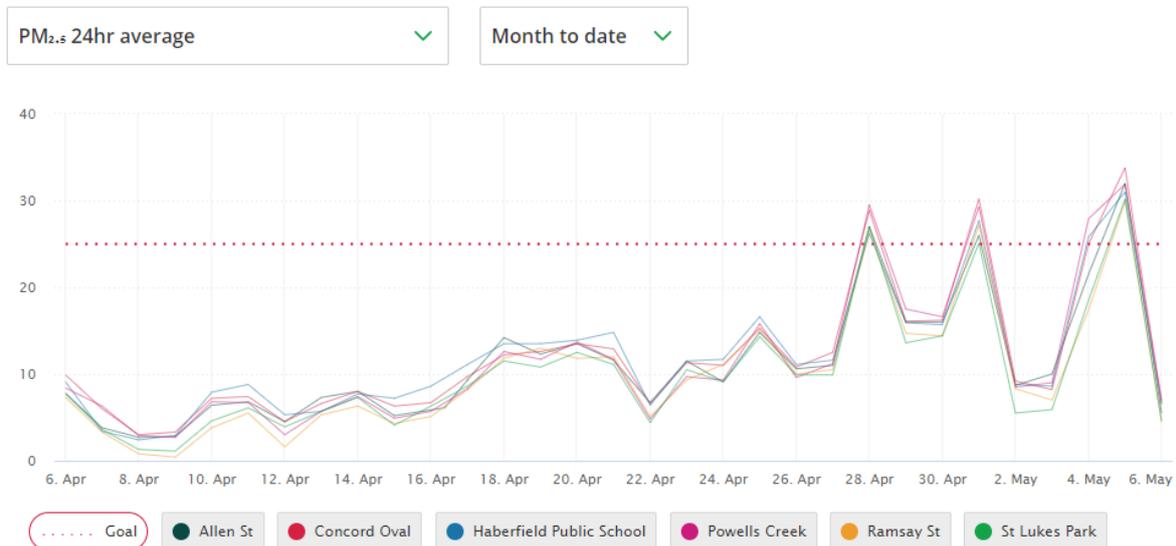


Figure 2: Ambient air quality data for PM<sub>2.5</sub> for all monitoring sites for the preceding month to date (6 May 2021).

### 2.3 27 April 2021 PM<sub>2.5</sub> - 24 Hour Average Data at All Monitoring Stations

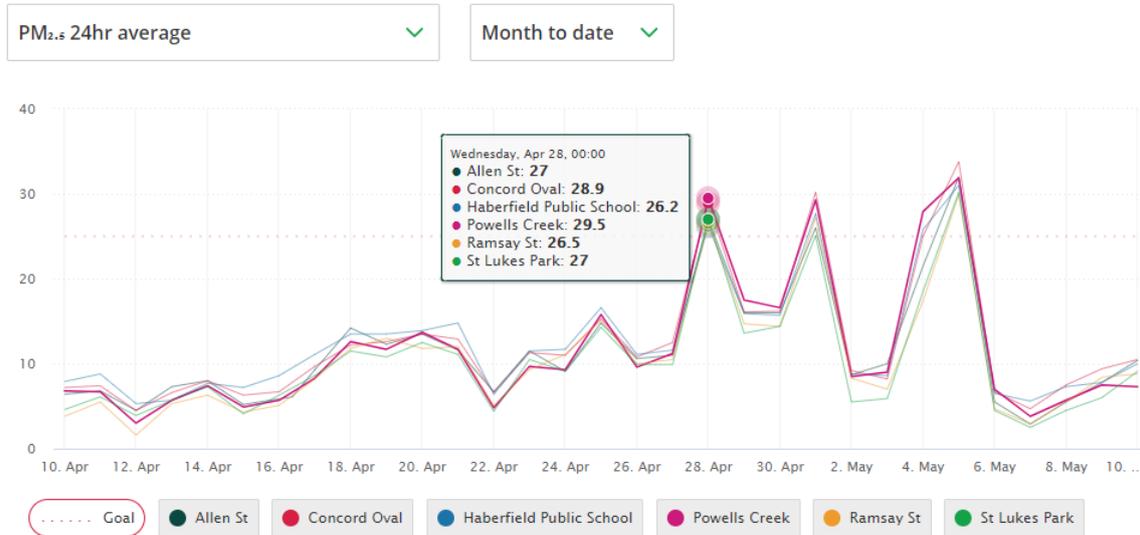


Figure 3: Ambient air quality data for PM<sub>2.5</sub> for all monitoring sites for 27 April 2021. (note that given the nature of a 24hour average, the results for 27 April 2021 are represented at midnight 28 April 2021 on the graph).

### 2.4 30 April 2021 PM<sub>2.5</sub> - 24 Hour Average Data at All Monitoring Stations



Figure 4: Ambient air quality data for PM<sub>2.5</sub> for all monitoring sites for 30 April 2021. (note that given the nature of a 24hour average, the results of 30 April 2021 are represented at midnight 1 May 2021 on the graph).

## 2.5 3 May 2021 PM<sub>2.5</sub> - 24 Hour Average Data at All Monitoring Stations

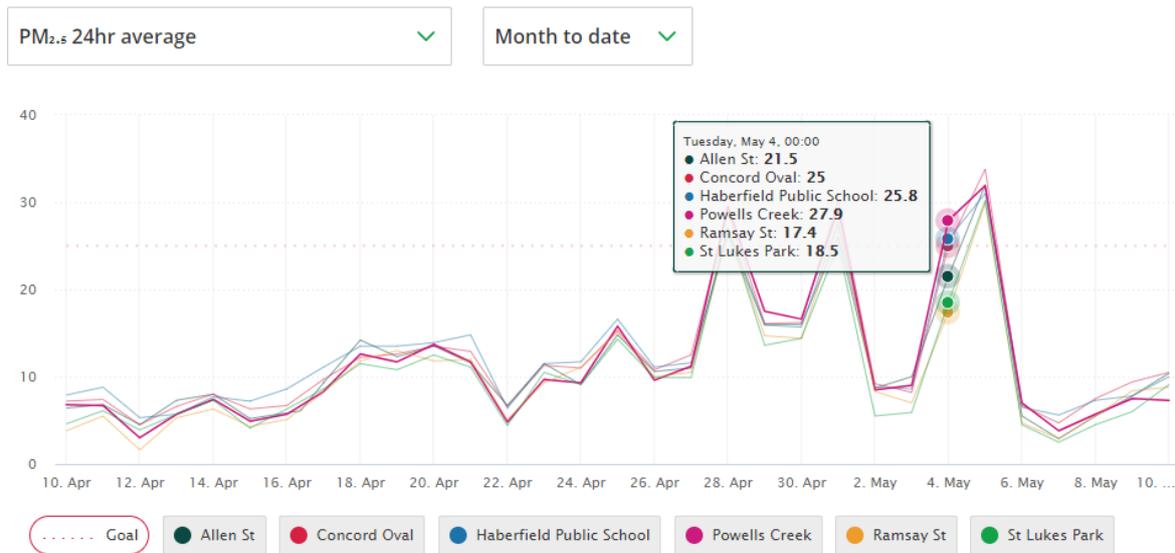


Figure 5: Ambient air quality data for PM<sub>2.5</sub> for all monitoring sites for 3 May 2021. (note that given the nature of a 24hour average, the results of 3 May 2021 are represented at midnight 4 May 2021 on the graph).

## 2.6 4 May 2021 PM<sub>2.5</sub> - 24 Hour Average Data at All Monitoring Stations

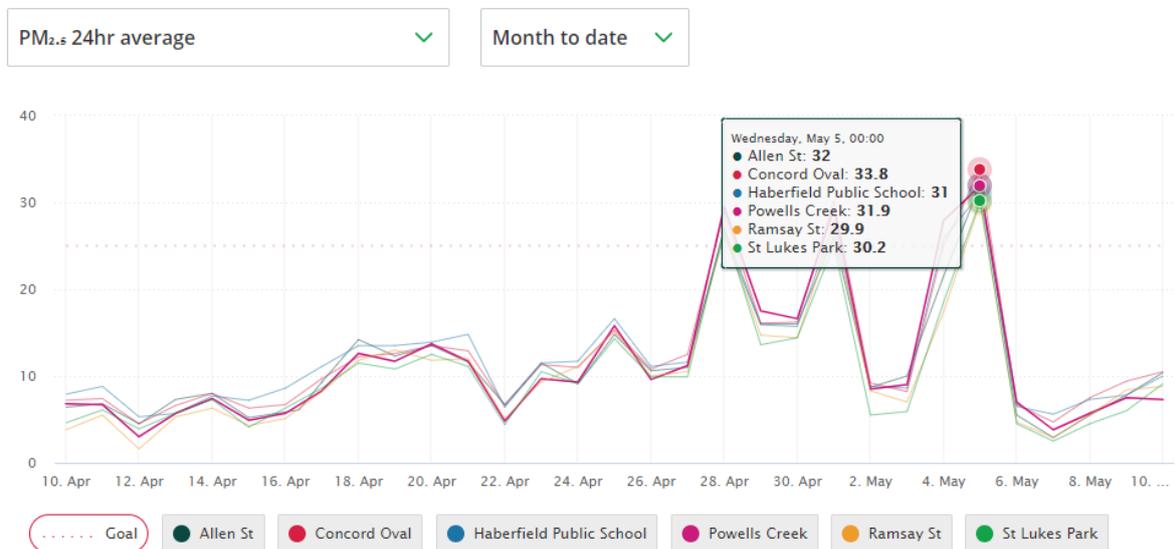


Figure 6: Ambient air quality data for PM<sub>2.5</sub> for all monitoring sites for 4 May 2021. (note that given the nature of a 24hour average, the results of 4 May 2021 are represented at midnight 5 May 2021 on the graph).

## 2.7 Solid Particles – 1 Hour Average Data Values from Ventilation Outlet Monitoring Equipment

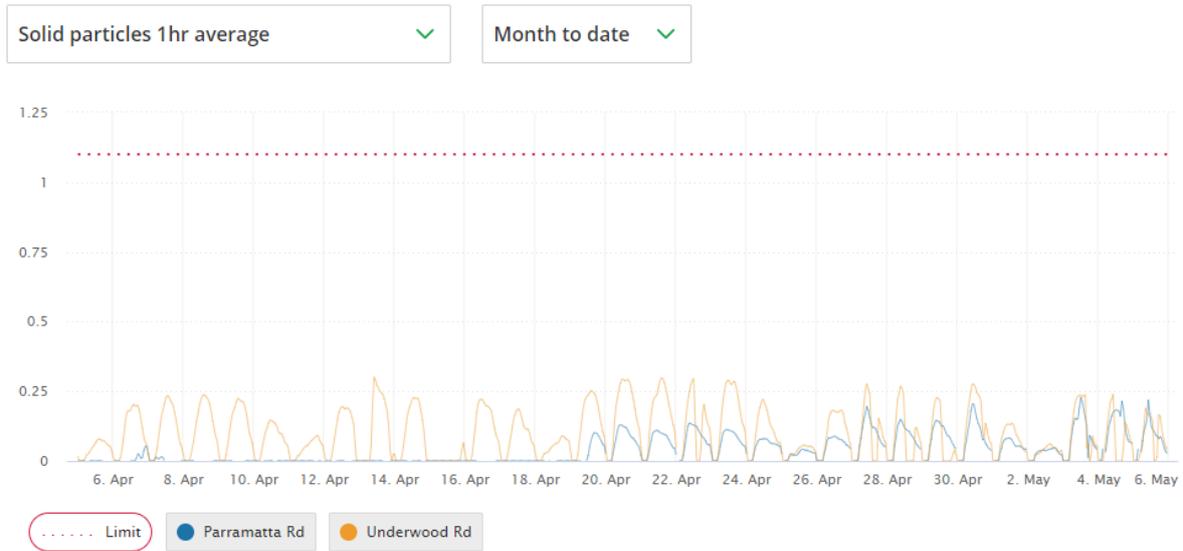


Figure 7: Ventilation outlet air quality data for solid particles (1hr avg) for all monitoring sites from 6 April to 6 May 2021.

## 2.8 Visibility – 15 Minute Maximum Data Values from In-Tunnel Monitoring Equipment

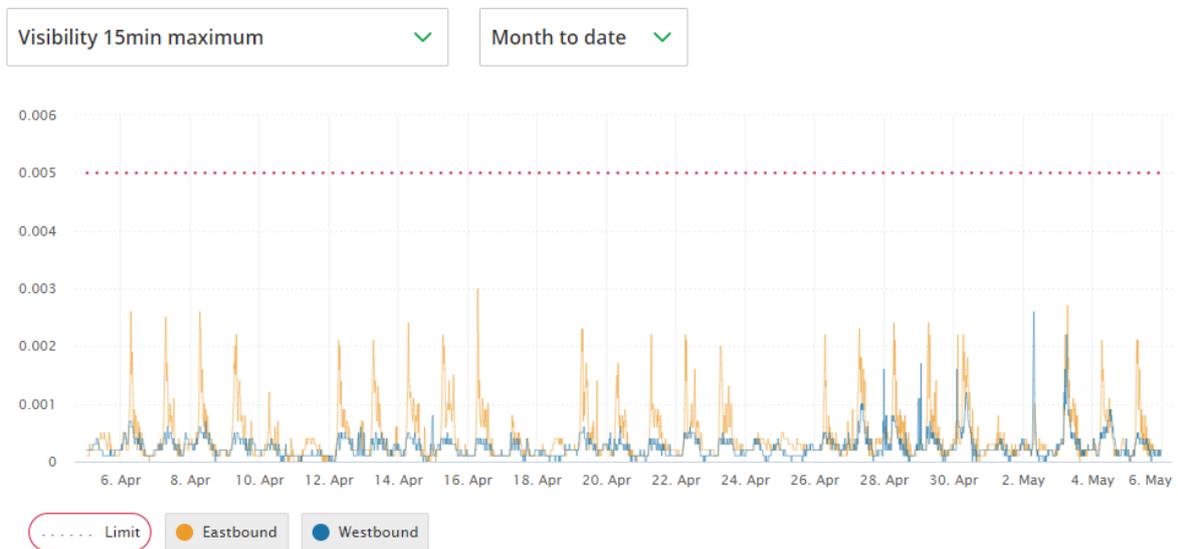


Figure 8: In-tunnel air quality data for visibility (15min max) for all monitoring sites from 6 April to 6 May 2021.

### 3. Background

#### 3.1 Monitoring Stations

The WestConnex - M4 East Project features various ventilation plant and equipment and air quality monitors to ensure pollutants do not exceed the targets and limits set by the Minister's Conditions of Approval. The WestConnex M4 East air quality monitors measure various pollutants across three mains areas, one of which includes ambient air quality in the areas around the M4 tunnels.

These stations include six external ambient air quality monitoring stations located at Allen Street, Powells Creek, St Lukes Park, Concord Oval, Ramsay Street and Haberfield Public School. The locations of these monitoring stations are outlined in Figure 9 below.

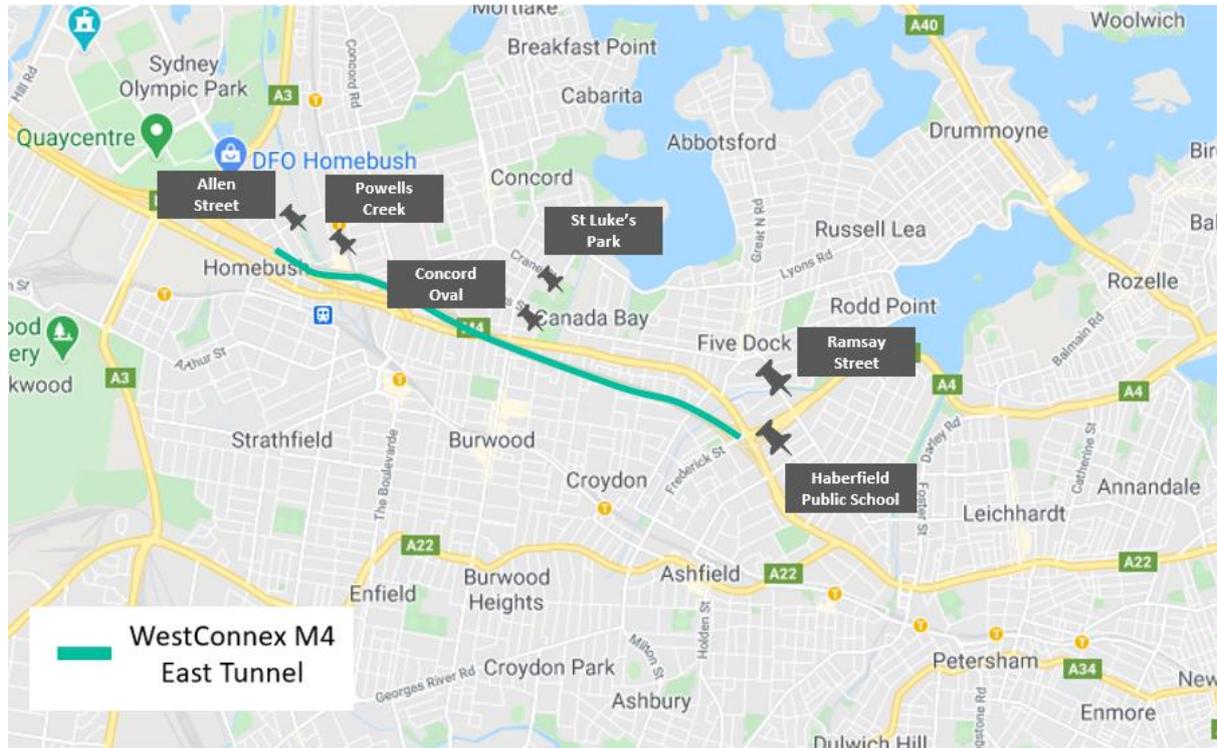


Figure 9: Location of Ambient Air Quality Monitoring Stations

#### 3.2 Ambient Air Quality Goals

Figure 10 below outlines the ambient air quality goals for each recorded parameter.

Parameter	Time Period	Goal Level	Units
CO	8 hours (rolling, based on 1-hour averages)	9.0	ppm
NO <sub>2</sub>	1 hour	0.12	ppm
PM <sub>10</sub>	1 day	50	µg/m <sup>3</sup>
	1 year	25	µg/m <sup>3</sup>
PM <sub>2.5</sub>	1 day	25	µg/m <sup>3</sup>
	1 year	8	µg/m <sup>3</sup>

Figure 10: Ambient Air Quality Goals

### 3.3 Validation of Data

The Ecotech Environmental Reporting Services (ERS) department performs daily data checks to ensure maximum data capture rates are maintained. Any equipment failures are communicated to the responsible field engineers for urgent rectification.

The validated database is created by duplicating the non-validated database and then flagging data affected by instrument faults, calibrations, and other maintenance activities. The data validation software requires the analyst to supply a valid reason (e.g. backed by maintenance notes, calibration sheets etc.) in the database for flagging any data as invalid.

### 3.4 Exceptional Events

Exceptional events, such as a fire or dust occurrence that adversely affects air quality at a particular location and causes an exceedance of 1-day average standards in excess of normal historical fluctuations and background levels, must include a description of the circumstances that led to the exceedance, as per the Ambient Air Quality National Environmental Protection Measure (NEPM).

## 4. Events Report

### 4.1 Investigation of Event

In order to determine the cause of the Above-Goal Readings and whether these can be attributed to external phenomena or events or emissions from the M4 East Motorway tunnel outlets, a review of information has been undertaken in line with the WestConnex Ambient Air Quality Goal Protocol that was prepared under MCoA E10.

It is noted that the Above-Goal Reading Notification for 4 May 2021 records an exceedance of  $PM_{2.5}$  at all six of the WestConnex M4 East ambient air quality monitoring stations, which correctly reflects the data published on the WestConnex M4 website. However, the Notification incorrectly reports the relevant location at just two monitoring stations (Haberfield Public School and Powells Creek) rather than correctly checking the boxes for all six monitoring stations.

The Above-Limit Reading Notification indicates that the data has not been quality validated, however as no known instrumentation fault or data error has occurred the investigation has proceeded on the basis that the data is valid.

As the notifications in Section 1 outline, no emergencies occurred at the time of the Above-Goal Readings as advised by the Proponent.

Data has been obtained from other ambient air quality monitoring stations in the Sydney Basin to confirm whether the Above-Goal Readings received at the monitoring stations near the WestConnex M4 East Tunnel were similar to other results for concurrent monitoring periods.

The NSW Government Environment, Energy and Science (EES) Group operates air quality monitoring networks that continuously measure particulate matter ( $PM_{10}$ ,  $PM_{2.5}$ ), sulfur dioxide ( $SO_2$ ), carbon monoxide ( $CO$ ), ozone ( $O_3$ ), nitrogen dioxide ( $NO_2$ ) and visibility. In addition to these, the stations also monitor wind speed and direction, air temperature and humidity.

The monitoring plan prepared as per the NEPM for Ambient Air Quality outlines that these EES Group monitoring stations, along with permanent upper bound stations, ensure that all major pollutant events are captured and reported.

Investigation of the 27 and 30 April 2021, and 3 and 4 May 2021 Above-Goal Readings also included news and media announcements taken from the NSW Rural Fire Service's (RFS) official Website and Twitter pages to confirm that external events comprising of hazard reduction burning were undertaken throughout these days.

## 4.2 Additional Data

### 4.2.1 Environment, Energy and Science Group

The following data has been obtained from the Department of Planning Industry and Environment’s website for the EES monitoring stations for the period concurrent with the Above-Goal Readings obtained from the WestConnex M4 East monitoring stations on 27 and 30 April 2021, and 3 and 4 May 2021.

		GOOD		FAIR		POOR		VERY POOR		EXTREMELY POOR	
		Ozone O3	Ozone O3	Nitrogen dioxide NO2	Visibility NEPH	Carbon monoxide CO	Sulfur dioxide SO2	Particles PM10	Particles PM2.5		
<u>Averaging Periods</u>		max 1-hour average	max rolling 4-hour average	max 1-hour average	max 1-hour average	max rolling 8-hour average	max 1-hour average	24-hour average	24-hour average		
<u>Units</u>		pphm	pphm	pphm	10 <sup>-4</sup> m <sup>-1</sup>	ppm	pphm	µg/m <sup>3</sup>	µg/m <sup>3</sup>		
Sydney East	Cook And Phillip	3.5	3.2	3.6	4.55	0.6	0.1	36.9	29.5		
	Chullora	3.4	3.3	3.8	9.18	0.5	0.1	39.5	30.3		
	Earlwood	4.2	3.8	1.8	6.58			37.6	25.9		
	Lidcombe	3.8	3.7	4.3	9.09	0.7	0.1	37.8	25.6		
	Macquarie Park	4.4	3.3	1.6	3.76		0.1	23.9	18.2		
	Randwick	4.7	4.5	2.6	3.91		0.2	27.0	17.4		
Sydney North-west	Rozelle	4.3	3.9	2.9	6.19	0.6	0.1	34.7	24.7		
	Parramatta North	3.9	3.8	3.3	2.87	0.5	0.2	38.3	18.2		
	Penrith	4.0	3.9	3.0	1.06	0.3	0.3	29.5	16.2		
	Prospect	4.2	4.1	3.3	2.43	0.3	0.2	33.2	18.3		
	Richmond	4.0	3.9	1.4	1.21		0.4	26.3	12.0		
	Rouse Hill	3.8	3.7		0.89			25.6	14.7		
Sydney South-west	St Marys	3.9	3.8	2.7	1.37			35.4			
	Bargo	4.3	3.7	2.2	12.86		0.2		65.3		
	Bringelly	3.8	3.7	1.7	14.20		0.1	69.0	57.4		
	Camden	3.9	3.8	2.2	18.03	1.5		66.2	66.7		
	Campbelltown West	3.6	3.4	3.6	22.18	1.9	0.2	111.9	99.9		
	Liverpool	3.7	3.5	3.6	12.39	1.0	0.3	61.7	52.2		
Illawarra	Oakdale	4.0	3.9	0.4	2.90			23.5	14.2		
	Wollongong	4.8	4.5	2.4	1.14	0.4	0.2	21.1	13.8		
	Kembla Grange	4.7	4.6	2.2	2.95			49.9	19.8		
Lower Hunter	Albion Park Sth	4.7	4.5	0.8	1.52		0.0	27.7	12.1		
	Newcastle	3.8	3.7	1.9	0.50	0.4	0.1	18.0	8.8		
	Beresfield	3.0	2.9	2.3	0.59		0.6	16.8	8.1		
Central Coast	Wallsend	3.5	3.2	2.4	0.61		0.1	15.5	8.7		
	Wyong	4.4	4.3	2.2	0.50	0.3	0.0	14.3	8.1		
Lake Macquarie	Morisset	4.0	3.7	1.3	0.49	0.1	1.6	11.6	7.0		
Central Tablelands	Bathurst	3.8	3.7					28.0	11.4		
	Orange	3.7	3.7		0.96			27.9	16.6		
Mid-north Coast	Coffs Harbour	2.9	2.7	1.7	0.21	0.2		13.3	5.7		
	Port Macquarie	2.8	2.7	1.0	0.26	0	0.0	10.5	5.5		
Northern Tablelands	Armidale				1.28			16.6	13.0		
North-west Slopes	Gunnedah	3.5	3.3	0.9				15.8	10.1		
	Narrabri										
	Tamworth	3.2	3.2					18.2	7.8		
Southern Tablelands	Goulburn	3.4	3.3	1.9	1.80			20.6	15.7		
South-west Slopes	Albury	3.5	3.4					24.4	12.8		
	Wagga Wagga Nth	4.0	3.9					59.3			
Muswellbrook Singleton	Muswellbrook			2.0			1.0	21.5	11.4		
	Singleton			1.4			0.1	16.2	7.8		
Merriwa	Merriwa	3.3	3.0	3.2	0.79	0.1	2.9	19.6	9.9		

Figure 11: Air quality monitoring data for Sydney for 27 April 2021 (source: <https://www.dpie.nsw.gov.au/air-quality/current-air-quality/daily>)

Friday  
30 April 2021  
[Previous](#) | [Next](#) | [Select](#)

GOOD	FAIR	POOR	VERY POOR	EXTREMELY POOR
------	------	------	-----------	----------------

Pollutants		Ozone O3	Ozone O3	Nitrogen dioxide NO2	Visibility NEPH	Carbon monoxide CO	Sulfur dioxide SO2	Particles PM10	Particles PM2.5
Averaging Periods		max 1-hour average	max rolling 4-hour average	max 1-hour average	max 1-hour average	max rolling 8-hour average	max 1-hour average	24-hour average	24-hour average
Units		pphm	pphm	pphm	10 <sup>-4</sup> m <sup>-1</sup>	ppm	pphm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
Sydney East	Cook And Phillip	1.9	1.7	3.5	3.52	0.6	0.2	26.2	20.7
	Chullora	2.4	2.0	3.0	8.95	0.5	0.8	36.4	29.9
	Earlwood	2.9	2.4	3.9	8.26			32.4	24.9
	Lidcombe	2.6	2.3	3.3	7.66	0.7	0.7	34.5	23.9
	Macquarie Park	2.7	2.5	1.8	2.54	0.5	0.6	18.7	19.9
	Randwick	3.4	3.0	2.9	2.81		0.4	19.7	14.6
Sydney North-west	Rozelle	2.4	2.2	3.3	5.92	0.7	0.2	29.0	19.6
	Parramatta North	2.4	2.2	2.4	1.92	0.5	0.7	35.9	15.9
	Penrith	3.1	2.8	1.4	1.44	0.3	0.3	21.9	14.8
	Prospect	2.5	2.3	2.4	1.61	0.4	0.6	26.1	18.2
	Richmond	3.2	3.0	1.1	2.37		0.3	23.4	20.1
	Rouse Hill	2.5	2.3	2.1	1.32	0.3	0.6	21.3	12.5
Sydney South-west	St Marys	2.3	2.1	2.3	1.12			26.9	13.7
	Bargo	2.8	2.8	1.8	4.44		0.9	19.6	22.0
	Bringelly	2.7	2.5	1.4	2.51		0.6	23.9	14.6
	Camden	2.8	2.8	1.4	4.50	0.4		28.5	23.6
	Campbelltown West	3.0	2.5	2.0	20.91	1.2	1.4	65.6	65.1
	Liverpool	2.3	2.2	2.7	8.43	0.5	1.7	50.9	32.3
Illawarra	Oakdale	3.0	2.9	0.6	1.51			20.5	15.3
	Wollongong	3.9	3.6	2.6	1.10	0.7	1.1	20.8	16.7
	Kembla Grange	3.4	3.1	1.2	3.80			38.2	23.4
Lower Hunter	Albion Park Sth	3.5	3.2	1.0	4.20		0.5	27.4	21.9
	Newcastle	3.5	3.2	1.7	0.38	0.5	0.1	15.6	6.7
	Beresfield	2.7	2.4	2.3	0.68		0.3	16.3	7.9
Central Coast	Wallsend	3.2	2.9	2.5	0.53		0.1	16.2	9.2
	Wyong	3.2	3.1	1.2	0.43	0.2	0.2	10.7	7.3
Lake Macquarie	Morisset	3.3	3.1	1.3	0.41	0.1	0.4	7.6	5.2
Central Tablelands	Bathurst	3.0	2.9					21.3	10.9
	Orange	2.9	2.9		1.12			25.4	17.6
Mid-north Coast	Coffs Harbour	2.0	1.9	1.3	0.26	0.2		6.0	2.4
	Port Macquarie	2.0	1.9	2.0	0.19	0	0.0	6.7	3.5
Northern Tablelands	Armidale				1.28			7.2	5.2
North-west Slopes	Gunnedah	2.9	2.8	1.2				11.6	5.8
	Narrabri							12.3	5.0
	Tamworth							11.0	3.5
Southern Tablelands	Goulburn	3.2	3.0	1.4	1.80			30.1	25.4
South-west Slopes	Albury	4.5	4.3					43.2	24.6
	Wagga Wagga Nth	4.6	4.4					69.1	
Muswellbrook	Muswellbrook			2.2			7.9	17.6	10.0
Singleton	Singleton			1.6			0.2	17.4	6.8
Merriwa	Merriwa	2.3	2.0	1.4	0.41	0.0	1.2	11.3	5.9

Figure 12: Air quality monitoring data for Sydney for 30 April 2021 (source: <https://www.dpie.nsw.gov.au/air-quality/current-air-quality/daily>)

Monday  
3 May 2021  
[Previous](#) | [Next](#) | [Select](#)

GOOD	FAIR	POOR	VERY POOR	EXTREMELY POOR
------	------	------	-----------	----------------

Pollutants		Ozone O3	Ozone O3	Nitrogen dioxide NO2	Visibility NEPH	Carbon monoxide CO	Sulfur dioxide SO2	Particles PM10	Particles PM2.5
Averaging Periods		max 1-hour average	max rolling 4-hour average	max 1-hour average	max 1-hour average	max rolling 8-hour average	max 1-hour average	24-hour average	24-hour average
Units		pphm	pphm	pphm	10 <sup>-4</sup> m <sup>-1</sup>	ppm	pphm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
Sydney East	Cook And Phillip	1.7	1.6	3.0	1.64	0.4	0.5	18.9	13.2
	Chullora	2.6	2.3	2.8	21.09	0.8	0.2	40.3	33.7
	Earlwood	2.7	2.4	2.6	14.87			32.6	24.6
	Lidcombe	3.0	2.9	2.8	17.91	0.9	0.2	36.2	26.2
	Macquarie Park	3.5	3.3	1.3	1.39	0.5	0.2	14.2	12.8
	Randwick	3.5	3.1	1.9	10.40		0.8	29.4	23.4
Sydney North-west	Rozelle	3.1	2.8	2.5	2.15	0.4	0.6	22.7	15.3
	Parramatta North	2.9	2.7	2.2	1.77	0.4	0.1	19.7	10.5
	Penrith	3.7	3.3	2.2	2.58	0.4	0.2	24.2	18.4
	Prospect	3.3	3.1	2.2	1.66	0.2	0.1	21.1	11.8
	Richmond	3.4	3.1	2.0	1.48		0.2	18.1	7.5
	Rouse Hill	3.1	2.9	1.0	2.16	0.3	0.1	18.0	11.3
Sydney South-west	St Marys	3.5	3.2	1.7	1.99			29.4	14.9
	Bargo	3.2	3.0	2.5	3.65		0.2	24.0	20.2
	Bringelly	3.4	3.1	2.1	3.33		0.2	39.9	25.7
	Camden	3.2	3.1	1.6	2.32	0.4		32.6	25.3
	Campbelltown West	3.1	2.6	3.5	4.80	0.9	0.2	35.1	30.9
	Liverpool	2.4	2.3	3.4	9.66	0.8	0.2	56.3	43.8
Illawarra	Oakdale	3.2	2.8	6.8	47.61			73.2	100.0
	Wollongong	4.2	3.7	3.0	1.37	0.4	0.9	24.0	14.5
	Kembla Grange	3.5	2.9	2.0	1.54			32.1	15.7
Lower Hunter	Albion Park Sth	3.9	3.2	2.1	1.60		0.6	24.3	13.4
	Newcastle	2.4	1.7	1.4	0.40	0.3	1.8	15.2	4.5
	Beresfield	2.7	2.4	1.2	0.61		0.8	10.6	3.5
Central Coast	Wallisend	1.9	1.7	1.7	0.60		2.6	12.3	6.5
	Wyong	2.4	2.3	1.5	0.20	0.3	0.8	11.9	4.8
	Morisset	2.5	2.1	1.2	0.43		1.4	9.0	4.5
Central Tablelands	Bathurst	2.9	2.6					13.2	6.5
	Orange	2.9	2.7		1.07			15.7	10.5
Mid-north Coast	Coffs Harbour	2.3	2.3	1.2	0.18	0.2		6.7	2.2
	Port Macquarie	2.4	2.3	0.5	0.12	0	0.1	7.0	3.4
Northern Tablelands	Armidale				1.16			8.5	6.5
North-west Slopes	Gunnedah	2.8	2.6	1.6				10.9	4.7
	Narrabri							9.7	3.1
	Tamworth							14.8	5.0
Southern Tablelands	Goulburn	2.6	2.6	2.1	1.51			8.0	5.2
	Albury	2.3	2.1					16.2	7.2
South-west Slopes	Wagga Wagga Nth	3.3	2.9					26.4	
	Muswellbrook			2.4			0.3	22.0	8.3
Singleton	Singleton			1.8			6.7	21.4	7.5
Merriwa	Merriwa	2.9	2.8	1.4	0.17	0.0	0.1	5.8	3.7

Figure 13: Air quality monitoring data for Sydney for 3 May 2021 (source: <https://www.dpie.nsw.gov.au/air-quality/current-air-quality/daily>)

Tuesday  
4 May 2021  
[Previous](#) | [Next](#) | [Select](#)

GOOD	FAIR	POOR	VERY POOR	EXTREMELY POOR
------	------	------	-----------	----------------

Pollutants		Ozone O3	Ozone O3	Nitrogen dioxide NO2	Visibility NEPH	Carbon monoxide CO	Sulfur dioxide SO2	Particles PM10	Particles PM2.5
Averaging Periods		max 1-hour average	max rolling 4-hour average	max 1-hour average	max 1-hour average	max rolling 8-hour average	max 1-hour average	24-hour average	24-hour average
Units		pphm	pphm	pphm	10 <sup>-4</sup> m <sup>-1</sup>	ppm	pphm	µg/m <sup>3</sup>	µg/m <sup>3</sup>
Sydney East	Cook And Phillip	1.0	0.7	3.6	2.17	0.6	0.2	31.1	23.2
	Chullora	0.7	0.4	2.5	3.64	0.5	0.2	37.0	32.2
	Earlwood	1.6	0.8	2.6	3.55			29.5	24.9
	Lidcombe	0.3	0.2	2.7	3.66	0.7	0.2	39.2	31.5
	Macquarie Park	0.5	0.4	2.3	1.64	0.6	0.1	26.7	23.6
	Randwick	2.6	2.1	2.8	1.97		0.4	25.5	18.8
Sydney North-west	Rozelle	1.5	1.2	2.5	2.68	0.6	0.2	32.1	25.2
	Parramatta North	0.3	0.2	2.3	2.79	0.6	0.2	42.5	26.8
	Penrith	1.2	0.9	1.9	6.98	0.8	0.1	73.5	72.5
	Prospect	0.6	0.3	2.4	3.13	0.4	0.2	37.4	24.9
	Richmond	0.6	0.4	1.2	4.46		0.1	54.0	44.1
	Rouse Hill	1.0	1.4	2.1	3.16	0.5	0.1	37.5	28.8
Sydney South-west	St Marys	1.0	0.8	1.4	4.46			54.9	40.3
	Bargo	2.8	1.6	0	2.78		0.1	17.6	15.7
	Bringelly	1.2	1.0	1.3	2.39		0.1	30.5	27.3
	Camden	1.3	1.2	1.1	3.25	0.3		28.1	26.4
	Campbelltown West	0.6	0.4	2.2	1.84	0.4	0.1	19.7	16.6
	Liverpool	0.2	0.2	2.9	8.34	0.9	0.2	42.6	40.7
Illawarra	Oakdale	2.6	2.4	0.3	1.80				14.2
	Wollongong	1.3	1.0	1.9	2.51	0.4	0.1	13.3	9.3
	Kembla Grange	1.4	1.3	1.1	2.04			13.6	8.0
Lower Hunter	Albion Park Sth	2.0	1.3	1.2	1.17		0.0	12.5	8.2
	Newcastle	1.5	1.2	1.7	0.60	0.4	2.0	15.6	5.6
	Beresfield	2.1	1.6	1.5	0.60		0.1	17.1	8.3
Central Coast	Wallsend	2.0	1.6	1.3	0.72		0.7	13.2	9.5
	Wyong	2.0	1.9	1.2	0.83	0.3	0.1	19.4	11.0
	Lake Macquarie	2.3	2.2	1.2	0.79		0.2	12.0	9.0
Central Tablelands	Morisset	2.5	2.3					7.7	4.3
	Orange	2.3	2.2		0.67			5.4	4.2
Mid-north Coast	Coffs Harbour	1.5	1.5	1.1	0.19	0.2		7.0	2.4
	Port Macquarie	1.9	1.7	0.6	0.30	0	0.1	7.2	3.8
Northern Tablelands	Armidale				2.14			11.7	9.5
North-west Slopes	Gunnedah	2.2	2.0	0.7				11.7	6.5
	Narrabri							8.0	3.1
	Tamworth							12.1	3.2
Southern Tablelands	Goulburn	2.0	2.3	1.4	0.33			5.4	4.6
South-west Slopes	Albury							11.7	7.9
	Wagga Wagga Nth	1.8	1.5					12.1	
Muswellbrook	Muswellbrook			1.4			0.1	15.0	7.1
Singleton	Singleton			1.8			2.7	22.0	6.3
Merriwa	Merriwa	2.7	2.6	0.2	0.13	0.0	0.0	8.4	1.7

Figure 14: Air quality monitoring data for Sydney for 4 May 2021 (source: <https://www.dpie.nsw.gov.au/air-quality/current-air-quality/daily>)

### 4.2.2 Bureau of Meteorology

The Bureau of Meteorology (BoM) is an exclusive agency of the Australian Government that is responsible for providing weather services to Australia. It is the main provider of weather forecasts warnings and observations to the Australian public. The following data has been taken from BoM's website that integrates information from diverse BoM services into groups of weather elements including records for daily weather observations as outlined below for April and May 2021.

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am					3 pm							
		Min °C	Max °C				Dir	Spd km/h	Time local	Temp °C	RH %	Cld g <sup>h</sup>	Dir	Spd km/h	MSLP hPa	Temp °C	RH %	Cld g <sup>h</sup>	Dir	Spd km/h	MSLP hPa	
1	Th	14.6	27.3	6.6	4.8	9.8	W	26	01:36		15.9	92	1	W	17	1025.0	26.7	58	2	E	13	1023.2
2	Fr	15.9	27.3	0	2.8	10.8	ESE	20	13:18		17.5	98	3	WNW	15	1026.5	26.3	60	1	ESE	15	1025.7
3	Sa	16.0	26.9	0	4.0	10.8	NE	30	12:50		17.3	97	1	WNW	19	1026.2	26.6	58	1	ENE	20	1022.3
4	Su	16.7	27.3	0	7.2	9.9	NNE	31	16:17		20.4	86	1	WNW	11	1019.8	25.0	71	6	E	11	1015.8
5	Mo	17.8	28.3	0	5.6	10.2	SSE	31	08:55		23.1	86	2	S	19	1019.5	28.2	64	2	SSE	19	1018.3
6	Tu	19.2	27.5	0.6	3.3	7.7	ESE	31	16:44		22.4	96	2	WNW	9	1021.9	24.3	77	6	ESE	20	1019.8
7	We	18.6	26.5	1.2	4.4	6.5	ENE	37	19:12		21.9	98	5	ESE	13	1019.3	23.7	77	7	SE	17	1015.7
8	Th	18.4	26.8	6.8	3.2	10.0	N	22	03:06		20.7	99	2	WNW	9	1014.0	26.7	64	2	E	13	1009.9
9	Fr	17.2	28.8	0	4.8	6.4	SSE	52	18:24		20.2	87	2	W	13	1005.3	28.6	51	1	W	4	1001.5
10	Sa	16.5	24.5	0.2	6.4	8.0	W	48	20:15		16.9	74	7	W	19	1006.9	23.9	34	1	W	26	1004.0
11	Su	13.5	19.7	0	5.8	10.6	W	67	10:04		16.5	42	1	W	31	1009.3	18.5	31	1	WSW	31	1010.2
12	Mo	9.6	20.5	0	6.8	10.9	WSW	37	08:20		13.7	54	1	W	24	1019.4	19.4	36	1	SSE	9	1018.2
13	Tu	10.3	22.9	0	4.0	10.2	W	31	06:58		14.5	71	1	WNW	15	1022.9	22.5	53	2	ENE	20	1018.1
14	We	14.1	27.8	0	5.4	8.5	NW	28	10:58		20.3	49	6	WNW	11	1015.0	26.0	31	5	NNW	13	1011.8
15	Th	16.3	26.7	0	6.4	10.2	W	33	23:26		19.8	51	1	WNW	11	1016.1	26.4	31	3	WNW	4	1012.1
16	Fr	15.7	21.9	0	6.4	5.8	SSE	44	11:06		18.4	50	5	WNW	15	1020.7	19.3	60	6	SSE	24	1021.4
17	Sa	14.6	18.5	0	4.0	0.1	SE	19	00:04		16.0	80	8	WNW	7	1023.3	18.2	60	8	ENE	7	1021.6
18	Su	10.9	23.1	0	4.0	9.6	W	24	05:03		14.4	86	4	W	15	1022.2	22.5	58	2	E	11	1018.9
19	Mo	11.8	24.2	0	1.6	10.5	WNW	22	04:09		14.9	86	1	WNW	17	1019.1	22.2	59	0	E	19	1014.4
20	Tu	11.2	22.9	0	4.0	6.8	WNW	28	00:14		15.9	67	2	WNW	13	1016.0	22.1	46	6	NNE	11	1010.7
21	We	14.1	20.9	0	5.2	10.4	SW	44	09:34		15.6	54	1	SW	20	1013.4	19.5	45	1	SSE	22	1013.0
22	Th	10.3	21.3	0	6.0	10.6	WSW	46	17:59		14.0	63	1	W	19	1013.5	20.3	33	1	WSW	17	1010.8
23	Fr	9.2	23.1	0	5.4	10.6	W	46	10:27		14.0	63	1	W	9	1018.0	22.4	41	1	ESE	17	1016.1
24	Sa	10.5	23.5	0	4.0	10.0	W	24	09:00		13.6	72	3	W	20	1022.7	21.7	53	5	ENE	15	1019.5
25	Su	11.3	23.8	0	3.2	9.7	W	30	07:00		14.9	67	1	WNW	20	1024.2	21.1	66	5	SE	19	1022.3
26	Mo	11.9	23.3	0	3.4	10.1	ENE	24	13:05		15.3	86	1	WNW	15	1025.7	21.6	58	2	E	11	1023.2
27	Tu	13.2	24.4	0	3.0	9.8	W	24	07:55		16.4	86	0	WNW	17	1027.8	21.8	61	1	ESE	15	1025.1
28	We	13.9	22.9	0	4.0	6.2	E	20	14:35		17.1	87	6	WNW	11	1026.5	21.7	63	7	ENE	13	1023.5
29	Th	12.8	22.8	0	2.6	9.8	E	24	13:05		15.7	90	0	W	13	1025.1	21.8	63	1	E	19	1022.8
30	Fr	13.0	24.1	0	3.6	7.9	ESE	24	14:59		15.4	94	6	WNW	17	1029.1	22.9	67	3	ESE	19	1026.9
<b>Statistics for April 2021</b>																						
Mean		14.0	24.3		4.5	8.9					17.1	77	2		15	1019.8	23.1	54	3		15	1017.2
Lowest		9.2	18.5	0	1.6	0.1					13.6	42	0	WNW	7	1005.3	18.2	31	0	#	4	1001.5
Highest		19.2	28.8	6.8	7.2	10.9		W	67		23.1	99	8	W	31	1029.1	28.6	77	8	WSW	31	1026.9
Total				15.4	135.3	268.4																

Figure 15: Daily weather observations for Sydney, April 2021 (source: <http://www.bom.gov.au/climate/dwo/202104/html/IDCJDW2124.202104.shtml>)

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am			3 pm									
		Min °C	Max °C				Dir	Spd km/h	Time local	Temp °C	RH %	Cld g <sup>th</sup>	Dir	Spd km/h	MSLP hPa	Temp °C	RH %	Cld g <sup>th</sup>	Dir	Spd km/h	MSLP hPa	
1	Sa	14.3	23.0	0	3.2	7.1	ENE	30	18:44	16.8	97	2	WNW	17	1030.4	22.1	76	2	E	17	1027.6	
2	Su	14.8	24.6	0	0.4	8.2	NNE	31	11:19	16.6	98	7	W	11	1028.5	22.4	72	7	ENE	20	1024.7	
3	Mo	13.8	24.7	0	4.0	7.6	NNE	26	17:04	15.1	100	6	WNW	13	1022.4	23.5	64	1	ENE	13	1017.8	
4	Tu	15.1	17.1	0	4.0	0.0	WSW	33	00:56	16.9	85	8	WNW	15	1016.7	15.3	94	8	WSW	9	1015.4	
5	We	14.2	19.5	18.0	73.0	0.7	S	35	11:36	15.3	100	7	SW	19	1014.9	18.6	86	7	SSW	19	1012.2	
6	Th	15.3	22.0	25.4	3.6	0.3	SSE	69	09:11	18.9	98	7	SSE	39	1011.8	21.2	91	7	SE	17	1011.3	
7	Fr	17.8	22.8	16.4	1.8	6.8	SSE	39	12:30	19.2	96	7	SSE	19	1011.4	21.7	77	6	SSW	22	1009.3	
8	Sa	15.0	26.2	0.4	3.8	6.7	WNW	24	09:15	17.3	96	5	WNW	19	1013.1	23.4	61	7	WNW	6	1012.1	
9	Su	16.2	19.4	0	4.4	0.0	WNW	26	07:13	17.7	71	7	WNW	15	1019.4	19.2	72	7	NW	4	1016.6	
10	Mo	13.7		0	2.2					16.6	87	0	W	20	1015.8							
<b>Statistics for the first 10 days of May 2021</b>																						
Mean		15.0	22.1		10.0	4.2				17.0	92	5		18	1018.4	20.8	77	5		14	1016.3	
Lowest		13.7	17.1	0	0.4	0.0				15.1	71	0	W	11	1011.4	15.3	61	1	NW	4	1009.3	
Highest		17.8	26.2	25.4	73.0	8.2	SSE	69		19.2	100	8	SSE	39	1030.4	23.5	94	8	SSW	22	1027.6	
Total				60.2	100.4	37.4																

Figure 16: Daily weather observations for Sydney, May 2021 (source: <http://www.bom.gov.au/climate/dwo/202105/html/IDCJDW2124.202105.shtml>)

### 4.2.3 News and Media Release

The following data has been obtained from the New South Wales Rural Fire Service (NSW RFS) who are the lead agency for the coordination of bush firefighting and prevention throughout the state. The NSW RFS have launched an application that shows every fire in NSW along with its size, severity, and warnings. NSW RFS provided notifications through this application, that hazard reduction burns had been scheduled for the period concurrent with the Above-Goal Readings of the WestConnex M4 East monitoring stations on 27 and 30 April 2021, and 3 and 4 May 2021. The hazard reduction burns scheduled, took place in Penrith, Parramatta, Lithgow, Wollondilly and Northern Beaches, as indicated in the below figures.

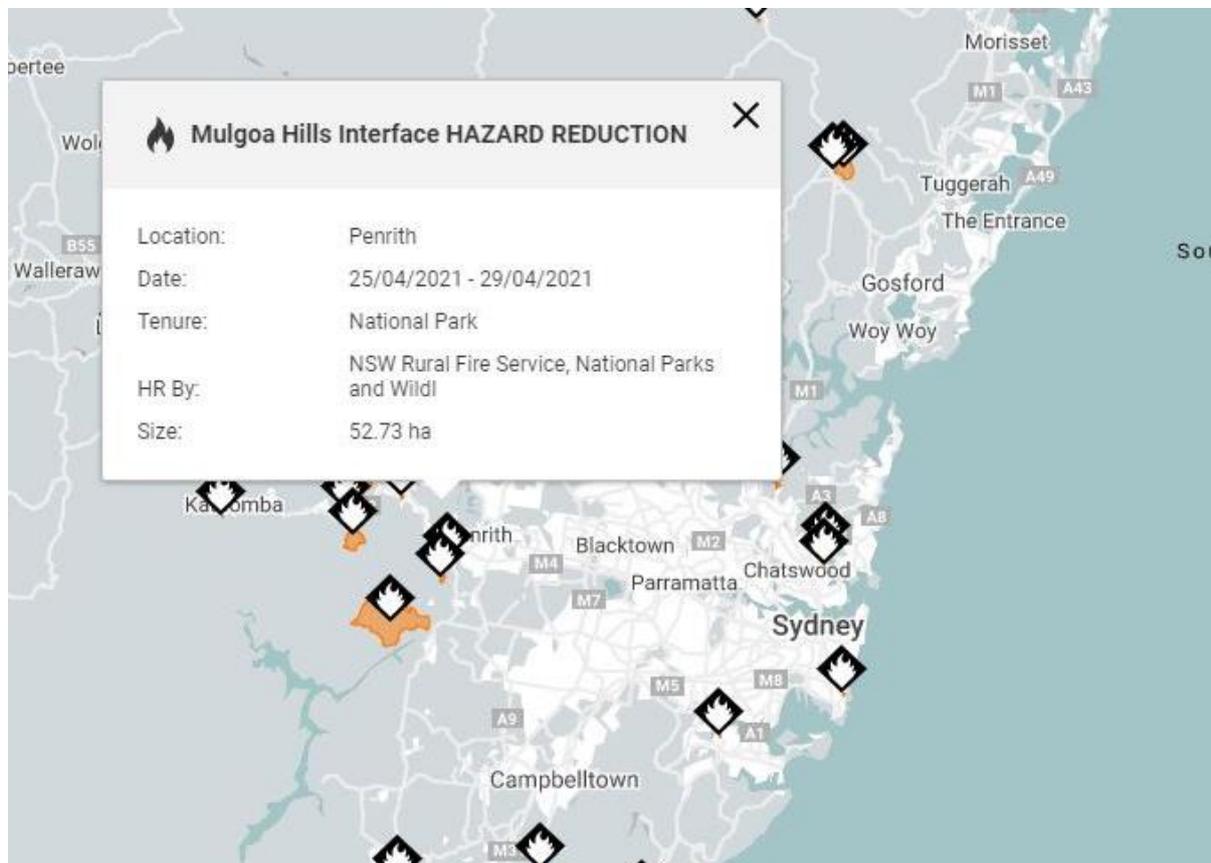


Figure 17: Planned hazard reduction burn in Lithgow between 25 and 29 April 2021

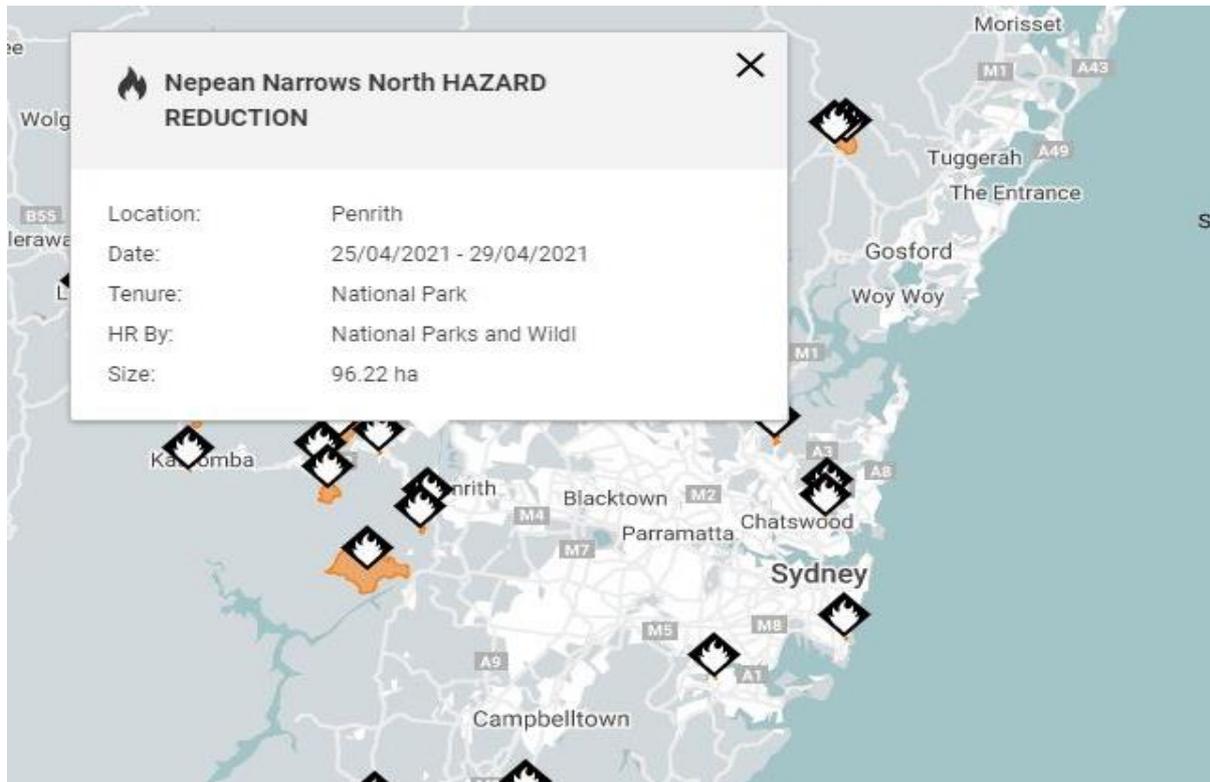


Figure 18: Planned hazard reduction burn in Lithgow between 25 and 29 April 2021

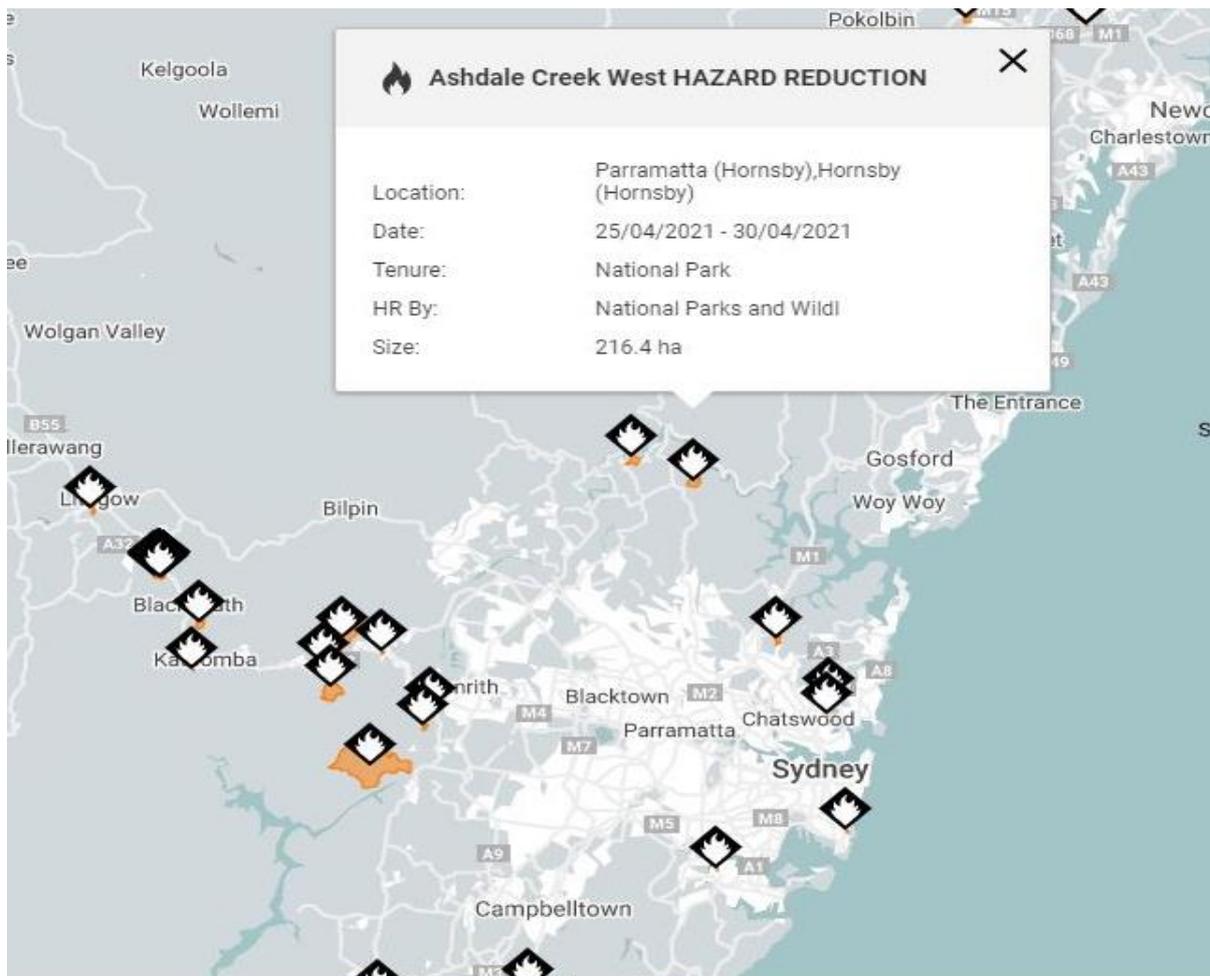


Figure 19: Planned hazard reduction burn in Lithgow between 25 and 30 April 2021

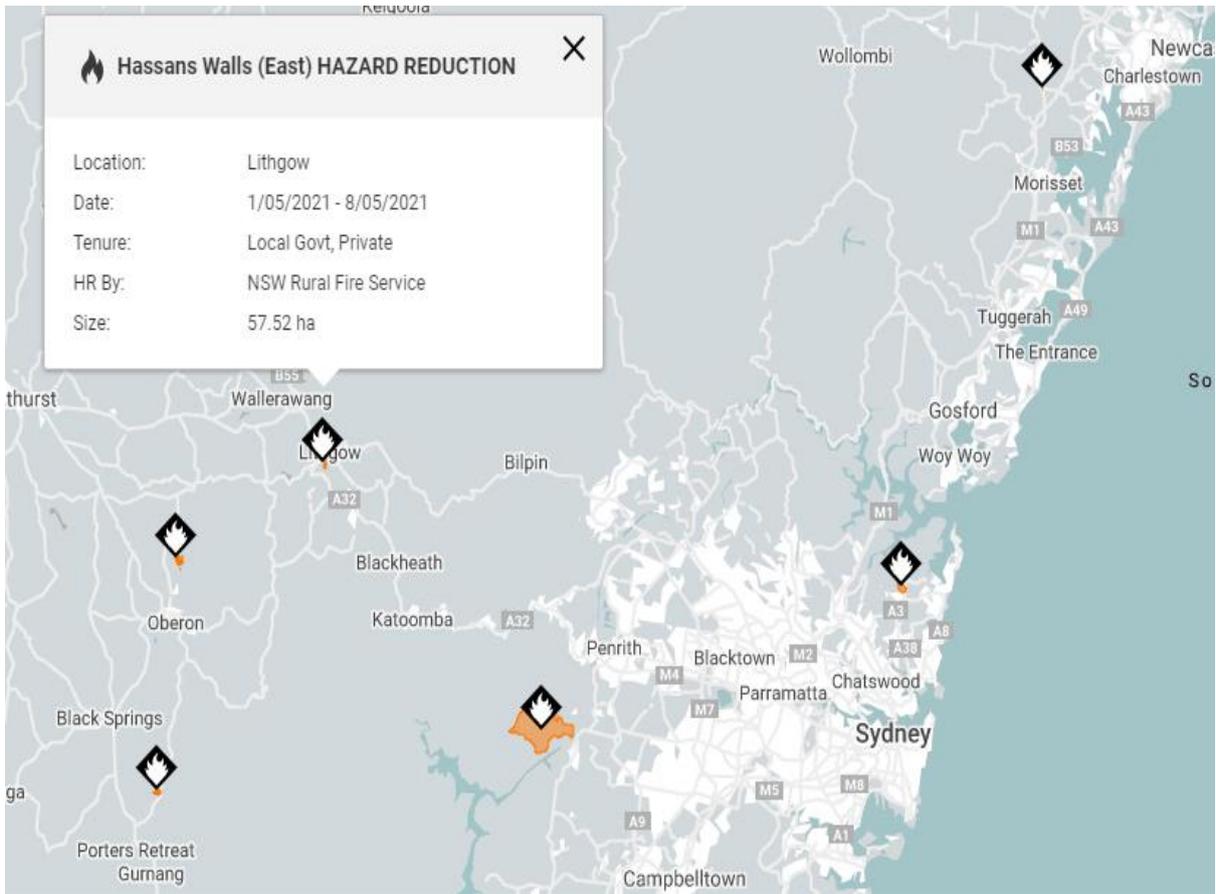


Figure 20: Planned hazard reduction burn in Lithgow between 1 and 8 May 2021

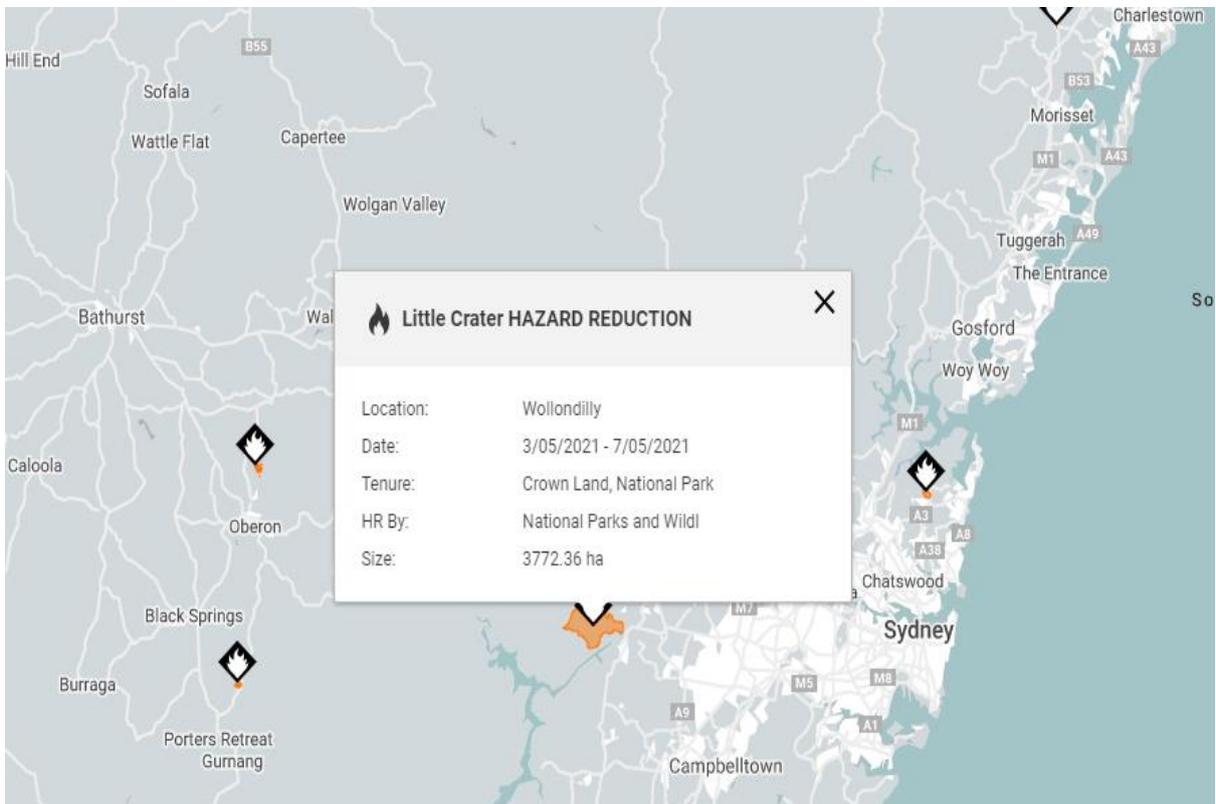


Figure 21: Planned hazard reduction burn in Wollondilly between 3 and 7 May 2021

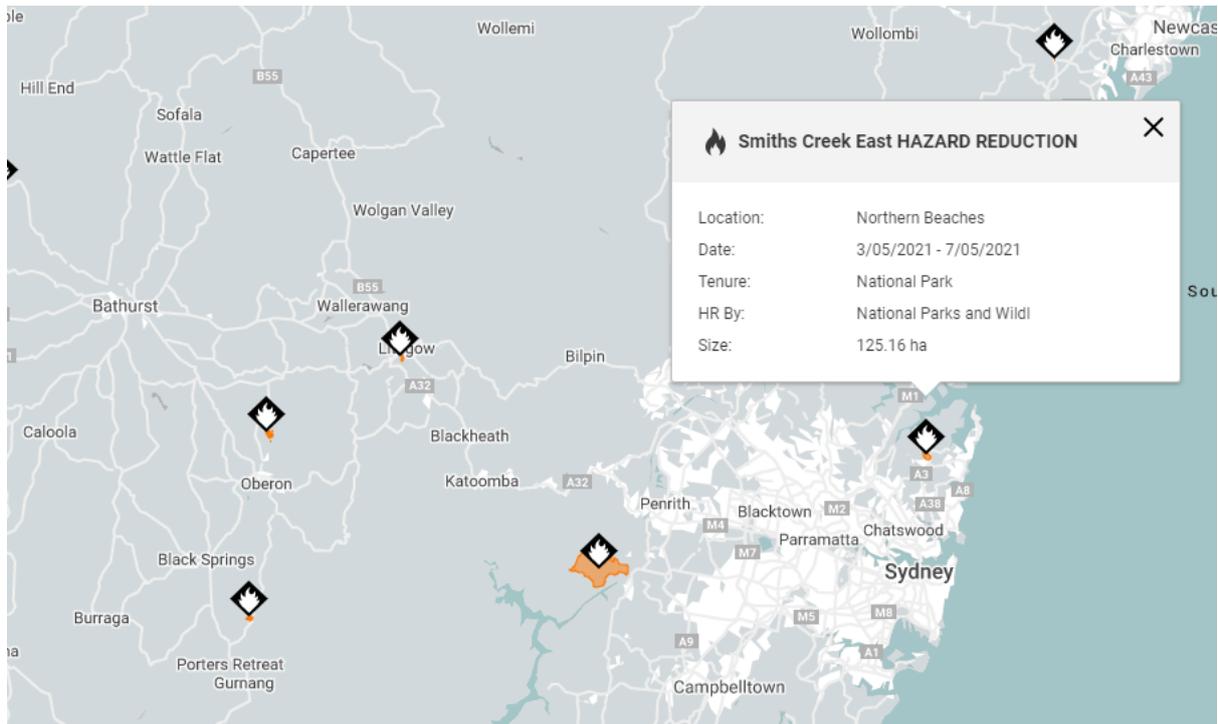


Figure 22: Planned hazard reduction burn in Northern Beaches between 3 and 8 May 2021

The following media releases have been obtained from the NSW RFS' Twitter page for the period concurrent with the Above-Goal Readings of the WestConnex M4 East monitoring stations on 27 and 30 April 2021, and 3 and 4 May 2021.

 **NSW RFS** @NSWRFS · Apr 26

Hazard reduction burns are once again underway in the Sydney and Wingecarribee areas. Burns around Avon Dam that were postponed last week will be completed today along with an new burn behind properties at Forestville on the Northern Beaches. #NSWRFS #NPWS



Figure 23: NSW RFS undertaking hazard reduction burning on 26 April 2021 as shown in the background.



**NSW RFS** @NSWRFS · Apr 27

As forecast smoke from hazard reduction burns has settled at low levels overnight. This is currently affecting parts of Sydney and the Illawarra/Shoalhaven. The smoke is expected to lift across the morning. Only call 000 for unattended fires. [#nswrfs rfs.nsw.gov.au/fire-informati...](https://rfs.nsw.gov.au/fire-informati...)



Figure 24: NSW RFS issuing smoke warning on 27 April 2021 as shown in the background.



**NSW RFS** @NSWRFS · Apr 28

Important hazard reduction burns have continued today across NSW. This included a burn in the Blue Mts near Woodford conducted by [#NSWRFS](#), [#FRNSW](#) and [#NPWS](#) crews. Essential work to help protect lives and property.



Figure 25: NSW RFS undertaking hazard reduction burning on 28 April 2021 as shown in the background.



**NSW RFS** @NSWRFS · Apr 30

Burns have continued today in the Blue Mts, Hawkesbury, Hills & Sutherland areas. There are a number of burns continuing over coming days and as a result smoke may settle overnight at low levels, lifting over the course of the day. #NSWRFS #NPWS #FRNSW Photos: @ShooterWol



Figure 26: NSW RFS undertaking hazard reduction burning on 30 April 2021 as shown in the background.



**NSW RFS** @NSWRFS · May 3

Hazard reduction burns have continued today in the Wallacia, Campbelltown & Helensburgh areas. Smoke is forecast to settle overnight across a number of suburbs before it clears during the morning. Rain is likely tomorrow & Wed. This is likely to see some burns postponed. #NSWRFS



Figure 27: NSW RFS undertaking hazard reduction 3 May 2021 as shown in the background.



**NSW RFS** @NSWRFS · May 3



Smoke and fog has settled across parts of Sydney, Southern Highlands and the Illawarra. This is forecast to clear across the morning. Rain is forecast later this week, this may result in burns being suspended for some time. [rfs.nsw.gov.au/fire-informati...](https://rfs.nsw.gov.au/fire-informati...)



Figure 28: NSW RFS issuing smoke warning on 3 May 2021 as shown in the background.

## 5. Findings

The elevated 24-hour average PM<sub>2.5</sub> readings across all six M4 east ambient monitoring stations on 27 and 30 April, and 4 May 2021, and across the two stations of Haberfield Public School and Powells Creek on 3 May 2021 are consistent with the EES Group monitoring stations that are closest.

On 27 April 2021, above-goal readings for 24-hour average PM<sub>2.5</sub> were recorded across all six M4 east ambient monitoring stations, Allen Street, Concord Oval, Haberfield Public School, Powells Creek, Ramsay Street and St Lukes Park. The EES Group monitoring stations closest to these monitoring stations, with readings above the goal limits, are Rozelle, Lidcombe and Chullora, with readings reported at 24.7 µg/m<sup>3</sup>, 25.6 µg/m<sup>3</sup> and 30.3 µg/m<sup>3</sup> respectively. The EES Group data, for 27 April 2021, outlines that air quality ranged from good to very poor.

On 30 April 2021, above-goal readings for 24-hour average PM<sub>2.5</sub> were recorded across all six M4 east ambient monitoring stations, Allen Street, Concord Oval, Haberfield Public School, Powells Creek, Ramsay Street and St Lukes Park. The EES Group monitoring stations closest to these monitoring stations, with readings above the goal limits, are Lidcombe and Chullora, with readings reported at 23.9 µg/m<sup>3</sup> and 29.9 µg/m<sup>3</sup> respectively. The EES Group data, for 30 April 2021, outlines that air quality ranged from good to very poor.

On 3 May 2021, above-goal readings for 24-hour average PM<sub>2.5</sub> were recorded at two M4 east ambient monitoring stations, Haberfield Public School and Powells Creek. The EES Group monitoring stations closest to these monitoring stations are Lidcombe and Chullora, with readings above the goal limits, reported at 26.2 µg/m<sup>3</sup> and 33.7 µg/m<sup>3</sup> respectively. The EES Group data, for 3 May 2021, outlines that air quality ranged from good to extremely poor.

On 4 May 2021, above-goal readings for 24-hour average PM<sub>2.5</sub> were recorded across all six M4 east ambient monitoring stations, Allen Street, Concord Oval, Haberfield Public School, Powells Creek, Ramsay Street and St Lukes Park. The EES Group monitoring stations closest to these monitoring stations are Rozelle, Lidcombe and Chullora, with readings above the goal limits, reported at 25.2 µg/m<sup>3</sup>, 31.5 µg/m<sup>3</sup> and 32.2 µg/m<sup>3</sup> respectively. The EES Group data, for 4 May 2021, outlines that air quality ranged from good to poor.

As mentioned in Section 4.2.3, NSW RFS have confirmed and released information on several planned hazard reduction burning activities, along with smoke warnings issued for Greater Sydney, being undertaken on the same days as the above-goal reading notification from the WestConnex M4 East monitoring stations.

The daily weather observation data obtained from BoM, as mentioned in Section 4.2.2, notes the wind direction as WNW on the mornings of 27 and 30 April 2021, and 3 and 4 May 2021, which would push smoke from the fires noted in 4.2.3 towards the M4 east ambient monitoring stations.

It is believed that the external event of hazard reduction burning carried out by NSW RFS is most likely the cause, or major contributor, of the exceedances.

Furthermore, all ventilation outlet and in-tunnel monitoring results for the same period were below specified limits as exhibited in the diagrams in Section 2.7 and 2.8. The results from the ventilation outlet and in-tunnel monitoring equipment directly measure the pollutants within the tunnel, as opposed to the ambient stations which can more easily be affected by external events. Therefore, it is thought that the results outlined in Section 2.7 and 2.8 are more accurate regarding the conditions in the tunnel in comparison with the ambient air quality monitoring stations.

## 6. Conclusion

The investigation into the cause of the exceedances has identified that the Above-Goal Readings recorded throughout all six WestConnex M4 East monitoring stations on 27 and 30 April 2021, and 4 May 2021, and two WestConnex M4 East monitoring stations (Haberfield Public School and Powells Creek) on 3 May 2021, were most likely the result of an external event(s) affecting the Sydney basin that caused the six monitoring stations to record 24-hour average PM<sub>2.5</sub> values greater than or equal to 25 µg/m<sup>3</sup>.

The additional data collected from the EES Group air quality monitoring stations across Sydney East (and also Sydney South-West and Sydney North-West), is consistent with the readings from the ambient air quality monitoring stations located near the tunnel, in recording elevated readings for PM<sub>2.5</sub>.

The images from the NSW RFS official Website and Twitter pages, show several planned hazard reduction burning activities undertaken on the days that coincide with the Above-Goal Reading events at the WestConnex M4 East monitoring stations. In addition, BoM wind data reports wind directions that would have pushed smoke from these fires towards the M4 east ambient monitoring stations.

The data provided by all other WestConnex in-tunnel monitoring stations, as well as ventilation outlet monitoring equipment, outlines that results for the same period were below specified limits. In addition, the Proponent has confirmed there were no emergencies or incidents occurring in the tunnel at the time of the exceedances that would contribute to elevated PM<sub>2.5</sub> levels.

Therefore, it has been concluded that the external hazard reduction burning events were most likely the cause or major contributor of the exceedance and it is unlikely to be attributable to emissions from the M4 East motorway tunnel outlets.

As the notifications of the Ambient Above-Goal Readings have been provided to the relevant agencies, an external event is most likely the cause of the Above-Goal Readings, and the operation of the tunnel has not been identified as a significant contributor of the exceedance, no further action is required as specified in the Minister's Condition of Approval E12.