

AIR MONITORING RISK ASSESSMENT  
CRINGILA PUBLIC SCHOOL - NW HOTSPOT  
35 SHEFFIELD STREET  
CRINGILA NSW 2502

Summary Report  
13/01/20 – 24/01/20

NSW Department  
of Education

Cringila Public School

35 Sheffield Street  
Cringila NSW 2502

January 2020  
C107471: J153825-03: TO/RC

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## Document Circulation

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# Air Monitoring Risk Assessment

Cringila Public School NW Hotspot – 35 Sheffield Street, Cringila NSW 2502

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## 1. INTRODUCTION

At the request of the Department of Education, Greencap were engaged to undertake air monitoring utilising real-time monitoring devices at Cringila Public School, 35 Sheffield Street Cringila NSW 2502. The aim of this monitoring program was primarily to investigate concerns raised by school employees and those of the public regarding the potential exposure to air pollutants originating from the pre-identified subsurface hotspot occurring in this particular area of the school.

Based on the correspondence provided by the NSW Department of Education, the objectives of this assessment are as follows:

- Undertake an assessment of the air quality at the source of the subsurface hotspot and to determine the extent of associated atmospheric pollutants (gases) distribution within Cringila Public School;
- Pollutants to be monitored using real-time monitors to provide a profile of air quality i.e. carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), volatile organic compounds, sulphur dioxide (SO<sub>2</sub>), hydrogen sulphide (H<sub>2</sub>S), methane (CH<sub>4</sub> – LEL), oxygen (O<sub>2</sub>), nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>).
- Real time monitoring was to provide a snapshot to determine the extent of atmospheric pollutant levels on School grounds.

This report presents the results relating to an ongoing air monitoring investigation carried out in the North-Western Hotspot between 13<sup>th</sup> January 2020 and 24<sup>th</sup> January 2020, situated on the Cringila Public School grounds, located at 35 Sheffield Street, Cringila NSW 2502.

## 2. ASSESSMENT CRITERIA

As demonstrated in **Table 1** below, the assessment criteria referenced as part of this project is based on several sources as this monitoring assessment had to consider numerous factors including outside air exposure, indoor air quality exposure and personal worker exposure. These reference sources included *Approved Methods for Modelling and Assessment of Air Pollutants in NSW* (NSW EPA 2016), *Workplace Exposure Standards for Airborne Contaminants* (SWA, 2013), *ASHRAE Standard 62.1 Ventilation for Acceptable Indoor Air Quality* (2016), or equivalent publications as a point of reference.

For the purpose of this assessment, these criteria values will be referenced in this report as they are deemed to be the most conservative levels based on the multifaceted monitoring works undertaken. It is however important to note that WES do not apply to children. Reference to WES is purely for guidance purposes only.

**Table 1 Air Quality Monitoring Assessment Criteria**

| <b>POLLUTANT</b>                          | <b>AVERAGING PERIOD</b> | <b>CRITERIA</b>   | <b>SOURCE</b>             |
|---|-------------------------|---|---------------------------|
| <i>Carbon monoxide (CO)</i>               | 8-hours                 | 9 ppm   | NSW EPA 2016 <sup>a</sup> |
|   |                         | 9 ppm   | ASHRAE Standard 62.1-2016 |
|   |                         | 30 ppm  | SWA 2013 <sup>b</sup>     |
| <i>Carbon dioxide (CO<sup>2</sup>)</i>    | 8-hours                 | 5000 ppm  | SWA 2013 <sup>b</sup>     |
|   |                         | Not greater than 700 ppm above local outdoor concentration levels | ASHRAE Standard 62.1-2016 |
| <i>Sulphur dioxide (SO<sup>2</sup>)</i>   | 24-hours                | 0.08 ppm (8 ppm)  | NSW EPA 2016 <sup>a</sup> |
|   | 8-hours                 | 2 ppm (5 ppm STEL) <sup>d</sup>                                   | SWA 2013 <sup>b</sup>     |
| <i>Hydrogen sulphide (H<sup>2</sup>S)</i> | 8-hour                  | 10 ppm (15 ppm STEL) <sup>d</sup>                                 | SWA 2013                  |
|   |                         | 0.9 ppm (Peak)  | NSW EPA 2016              |
| <i>Nitric oxide (NO)</i>                  | 8-hour                  | 25 ppm  | SWA 2013                  |
| <i>Nitrogen dioxide (NO<sup>2</sup>)</i>  | 1-hour                  | 0.12 ppm (12 ppm)   | NSW EPA 2016 <sup>a</sup> |
|   | 8-hours                 | 3 ppm (5 ppm STEL) <sup>d</sup>                                   | SWA 2013 <sup>b</sup>     |
| <i>Oxygen (O<sup>2</sup>)</i>             | -                       | 19.5-23.5%  | SWA 2011 <sup>c</sup>     |
| <i>Volatile organic compounds (VOC)</i>   | -                       | Contaminant specific  | -                         |
| <i>Methane (as LEL)</i>                   | -                       | <5%   | SWA 2011 <sup>c</sup>     |

**Sources:**

a - NSW EPA 2016, Approved methods for the Modelling and Assessment of Air Pollutants in New South Wales, NSW Environment Protection Authority.

b - SWA 2013, Workplace Exposure Standards for Airborne Contaminants, Safe Work Australia. These concentrations are based on Time Weighted Averages (TWA) for an 8-hour shift.

c - SWA 2011, Confined Spaces Code of Practice, Safe Work Australia. These concentrations are based on conditions that do not pose an immediate risk to human health.

d - Short term exposure limit (STEL) means the average airborne concentration of a substance calculated over a 15-minute period. The STEL should not be exceeded at any time during a normal eight hour working day.

### 3. AIR QUALITY MONITORING METHODOLOGY

#### 3.1 SPOT CHECK / REAL TIME AIR QUALITY MONITORING

‘Spot-check’ air quality monitoring at locations within the vicinity of the subsurface hotspot area was conducted to determine the extent of atmospheric pollutants (gases) associated with the hotspot. Pollutants monitored using real-time Multi-Gas Detectors provided and continue to provide a profile of air quality which include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), volatile organic compounds (VOCs), sulphur dioxide (SO<sub>2</sub>), hydrogen sulphide (H<sub>2</sub>S), methane (CH<sub>4</sub>) as LEL, oxygen (O<sub>2</sub>), nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>).

These air quality parameters were recorded at specific nominated locations within the northwest hotspot area over an interval of up to 15 minutes at each location. Monitoring included sensitive receptors such as locations within the school boundary and adjacent neighbouring residences in order to effectively delineate the extent and distribution of these atmospheric pollutants. This will be performed at the digression of the Greencap Consultant on site.

In this assessment, RAE Systems Multi RAE Gas Detectors were used with specific sensor configurations to target the nominated pollutants/gases to be assessed against the Air Quality Monitoring Criteria detailed below in **Table 2**. Each unit will be configured to log data at one second intervals, and upper and lower alarm limits will be set to reflect the adopted air monitoring criteria.

**Table 2 Multi-Gas Detector Sensor Specifications**

| <b>UNIT</b>                    | <b>SENSOR</b>    | <b>RANGE</b>    | <b>RESOLUTION</b> |
|--------------------------------|------------------|-----------------|-------------------|
| <i>Multi RAE Lite – Unit 1</i> | SO <sub>2</sub>  | 0 to 20 ppm     | 0.1 ppm           |
|                                | NO               | 0 to 250 ppm    | 0.5 ppm           |
|                                | NO <sub>2</sub>  | 0 to 20 ppm     | 0.1 ppm           |
|                                | O <sub>2</sub>   | To 30% (Volume) | 0.1% (Volume)     |
|                                | VOCs             | 0 to 1,000 ppm  | 1 ppm             |
| <i>Multi RAE Lite – Unit 2</i> | CO               | 0 to 200 ppm    | 0.1 ppm           |
|                                | CO <sub>2</sub>  | 0 to 50,000 ppm | 100 ppm           |
|                                | H <sub>2</sub> S | 0 to 100 ppm    | 0.1 ppm           |
|                                | LEL (Methane)    | 0 to 100%       | 1%                |

#### 3.2 MONITORING LOCATIONS

Spot measurements were taken within the North-Western Hotspot area and at surrounding locations to determine whether potential air pollutants from the subsurface hotspot were present. These monitoring locations included the following:

- A-01 General Background
- A-02 NW Hotspot – Concrete Cap Surface
- A-03 NW Hotspot – Small Mound
- A-04 NW Hotspot – NE fence line
- A-05 Exclusion Area Fence Line East of Hotspot (Approx. 10m)
- A-06 Exclusion Area Fence Line Southeast of Hotspot (Approx. 15m)
- A-07 Exclusion Area Fence Line South of Hotspot (Approx. 30m)
- A-08 Exclusion Area Fence Line Northwest of Hotspot, adjacent 17 Lackawanna Street (Approx. 50m)

#### 4. SPOT CHECK / REAL TIME AIR MONITORING RESULTS

The atmospheric pollutant results for each monitoring event are summarised in the tables below, and monitoring locations can be viewed in **Appendix A**.

| <b>Date of Monitoring: Wednesday 15<sup>th</sup> January 2020</b> |  |                            |   |  |  |                         |   |                              |  |                      |                                  |
|---|--|----------------------------|---|--|--|-------------------------|---|------------------------------|--|----------------------|----------------------------------|
| <b>Location</b>   |  | Carbon monoxide (CO) (ppm) | Carbon dioxide (CO <sup>2</sup> ) (ppm) | Sulphur dioxide (SO <sup>2</sup> ) (ppm) | Hydrogen sulphide (H <sup>2</sup> S) (ppm) | Nitric oxide (NO) (ppm) | Nitrogen dioxide (NO <sup>2</sup> ) (ppm) | Oxygen (O <sup>2</sup> ) (%) | Volatile organic compounds (VOC) (ppm) | Methane (as LEL) (%) | <b>Within Acceptable Limits?</b> |
| A-01  | <i>General Background – West of Site Fence</i>   | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-02  | <i>NW Hotspot – Adjacent Concrete Cap</i>  | 0                          | 200                                     | 0.1                                      | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-03  | <i>NW Hotspot – Small Mound</i>  | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-04  | <i>NE Fence Line Adjacent Hotspot</i>  | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-05  | <i>Exclusion Area Fence Line East of Hotspot (Approx. 10m)</i>                                     | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-06  | <i>Exclusion Area Fence Line Southeast of Hotspot (Approx. 15m)</i>                                | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-07  | <i>Exclusion Area Fence Line South of Hotspot (Approx. 30m)</i>                                    | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-08  | <i>Exclusion Area Fence Line Northwest of Hotspot, adjacent 17 Lackawanna Street (Approx. 50m)</i> | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |



| <b>Date of Monitoring: Thursday 16<sup>th</sup> January 2020</b> |   |                            |   |  |  |                         |   |                              |  |                      |                                  |
|--|---|----------------------------|---|--|--|-------------------------|---|------------------------------|--|----------------------|----------------------------------|
| <b>Location</b>  |   | Carbon monoxide (CO) (ppm) | Carbon dioxide (CO <sup>2</sup> ) (ppm) | Sulphur dioxide (SO <sup>2</sup> ) (ppm) | Hydrogen sulphide (H <sup>2</sup> S) (ppm) | Nitric oxide (NO) (ppm) | Nitrogen dioxide (NO <sup>2</sup> ) (ppm) | Oxygen (O <sup>2</sup> ) (%) | Volatile organic compounds (VOC) (ppm) | Methane (as LEL) (%) | <b>Within Acceptable Limits?</b> |
| A-01   | General Background – West of Site Fence   | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-02   | NW Hotspot – Adjacent Concrete Cap  | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-03   | NW Hotspot – Small Mound  | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-04   | NE Fence Line Adjacent Hotspot  | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-05   | Exclusion Area Fence Line East of Hotspot (Approx. 10m)                                     | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-06   | Exclusion Area Fence Line Southeast of Hotspot (Approx. 15m)                                | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-07   | Exclusion Area Fence Line South of Hotspot (Approx. 30m)                                    | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-08   | Exclusion Area Fence Line Northwest of Hotspot, adjacent 17 Lackawanna Street (Approx. 50m) | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |

| <b>Date of Monitoring: Tuesday 21<sup>st</sup> January 2020</b> |   |                            |   |  |  |                         |   |                              |  |                      |                                  |
|---|---|----------------------------|---|--|--|-------------------------|---|------------------------------|--|----------------------|----------------------------------|
| <b>Location</b>   |   | Carbon monoxide (CO) (ppm) | Carbon dioxide (CO <sup>2</sup> ) (ppm) | Sulphur dioxide (SO <sup>2</sup> ) (ppm) | Hydrogen sulphide (H <sup>2</sup> S) (ppm) | Nitric oxide (NO) (ppm) | Nitrogen dioxide (NO <sup>2</sup> ) (ppm) | Oxygen (O <sup>2</sup> ) (%) | Volatile organic compounds (VOC) (ppm) | Methane (as LEL) (%) | <b>Within Acceptable Limits?</b> |
| A-01  | General Background – West of Site Fence   | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-02  | NW Hotspot – Adjacent Concrete Cap  | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-03  | NW Hotspot – Small Mound  | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-04  | NE Fence Line Adjacent Hotspot  | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-05  | Exclusion Area Fence Line East of Hotspot (Approx. 10m)                                     | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-06  | Exclusion Area Fence Line Southeast of Hotspot (Approx. 15m)                                | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-07  | Exclusion Area Fence Line South of Hotspot (Approx. 30m)                                    | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-08  | Exclusion Area Fence Line Northwest of Hotspot, adjacent 17 Lackawanna Street (Approx. 50m) | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |

| <b>Date of Monitoring: Thursday 23<sup>rd</sup> January 2020</b> |   |                            |   |  |  |                         |   |                              |  |                      |                                  |
|--|---|----------------------------|---|--|--|-------------------------|---|------------------------------|--|----------------------|----------------------------------|
| <b>Location</b>  |   | Carbon monoxide (CO) (ppm) | Carbon dioxide (CO <sup>2</sup> ) (ppm) | Sulphur dioxide (SO <sup>2</sup> ) (ppm) | Hydrogen sulphide (H <sup>2</sup> S) (ppm) | Nitric oxide (NO) (ppm) | Nitrogen dioxide (NO <sup>2</sup> ) (ppm) | Oxygen (O <sup>2</sup> ) (%) | Volatile organic compounds (VOC) (ppm) | Methane (as LEL) (%) | <b>Within Acceptable Limits?</b> |
| A-01   | General Background – West of Site Fence   | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-02   | NW Hotspot – Adjacent Concrete Cap  | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-03   | NW Hotspot – Small Mound  | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-04   | NE Fence Line Adjacent Hotspot  | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-05   | Exclusion Area Fence Line East of Hotspot (Approx. 10m)                                     | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-06   | Exclusion Area Fence Line Southeast of Hotspot (Approx. 15m)                                | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-07   | Exclusion Area Fence Line South of Hotspot (Approx. 30m)                                    | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |
| A-08   | Exclusion Area Fence Line Northwest of Hotspot, adjacent 17 Lackawanna Street (Approx. 50m) | 0                          | 200                                     | 0  | 0  | 0                       | 0   | 20.9                         | 0                                      | 0                    | ✓                                |

## 5. DISCUSSION

Based on the air quality monitoring data obtained as part of this monitoring assessment, the inhalation risk to human health as a result of the subsurface hotspot remains low. The reasons for this conclusion is as follows:

- Real time monitoring results did not indicate the presence of gas in elevated concentrations; even at the source (i.e. the subsurface hotspot vent source). Concentrations of gases commonly associated with combustion (e.g. carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), volatile organic compounds, sulphur dioxide (SO<sub>2</sub>), hydrogen sulphide (H<sub>2</sub>S), methane (CH<sub>4</sub> – LEL), oxygen (O<sub>2</sub>), nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>), were not detected at concentrations that pose a risk to human health in the North-Western Hotspot area, including locations surrounding the hotspot.

This concludes the air quality monitoring summary report from 13<sup>th</sup> January 2020 and 24<sup>th</sup> January 2020. It is recommended that weekly assessments are conducted to continually monitor the potential risk to human health whilst further investigation of the site is undertaken.

## Air Monitoring Risk Assessment

**Cringila Public School NW Hotspot – 35 Sheffield Street, Cringila NSW 2502**

### **Appendix A: Site Map and Sampling Locations**



**Legend:**

- ✖ Sampling Location
- A-00** Sample Location ID
- ..... Fence-line

|            |                         |
|------------|-------------------------|
| Site       | Cringila Public School  |
| Area       | Northwest Hotspot       |
| Consultant | Tom Oyston              |
| Date       | Friday, 24 January 2020 |
| Job Number | J153825-03              |
| Report     | AMR-15                  |
| Version    | 1.0                     |