

#### **Upper Hunter Mining Dialogue**

### Air Quality Monitoring Data Analysis Project

#### Presented by: Damon Roddis 19 November 2019

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The business of sustainability

#### Air Quality Monitoring Data Analysis Project

- Analysis of publically available environmental monitoring data:
  - Upper Hunter Air Quality Monitoring Network (UHAQMN)
  - NSW Regional Air Quality Monitoring Stations
  - Bureau of Meteorology (BoM).
- Project underway to be completed later this year / early 2020.
- Key points of investigation:
  - 1. Has the air quality in the Upper Hunter changed since monitoring began?
  - 2. Is the air quality in the Upper Hunter measured at the monitoring stations different from air quality measured at other locations in NSW?

#### **Particulate Matter (PM)**

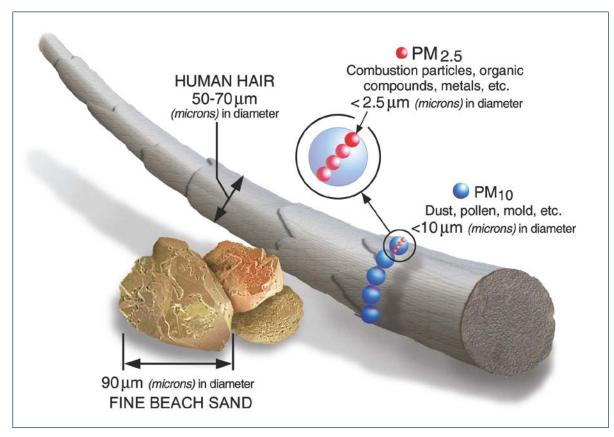
- National ambient air quality standards for specific size fractions and averaging periods:
  - PM10 and PM2.5
  - 24 hour and annual averages.
- Analysis primarily focuses on:

#### <u>PM10</u>:

Size fraction associated with mechanical processes (e.g. mining, wind erosion). Inclusive of PM<sub>2.5</sub>.

#### Annual averages:

Allow analysis of overall trends and performance (removes 'noise').



Source: US Environmental Protection Agency

### **Air Quality Monitoring Stations**

- Sydney five locations
- Lower Hunter six locations
- Upper Hunter 14 locations
- Illawarra three locations
- Other regional areas four locations

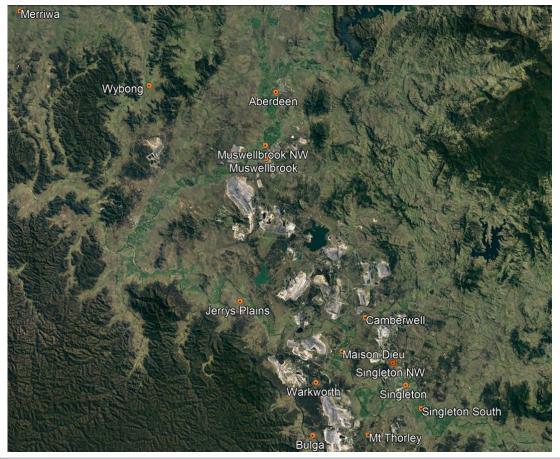


Camberwell AQMS

Source (OEH, 2016)

### **Upper Hunter Air Quality Monitoring Network**

The Upper Hunter Air Quality Monitoring Network was created by the Department of Planning, Industry and Environment, in partnership with the Upper Hunter coal and power industries, in response to community concern about the effect of coal mining on air quality in the region.



Population centres = Singleton, Muswellbrook and Aberdeen

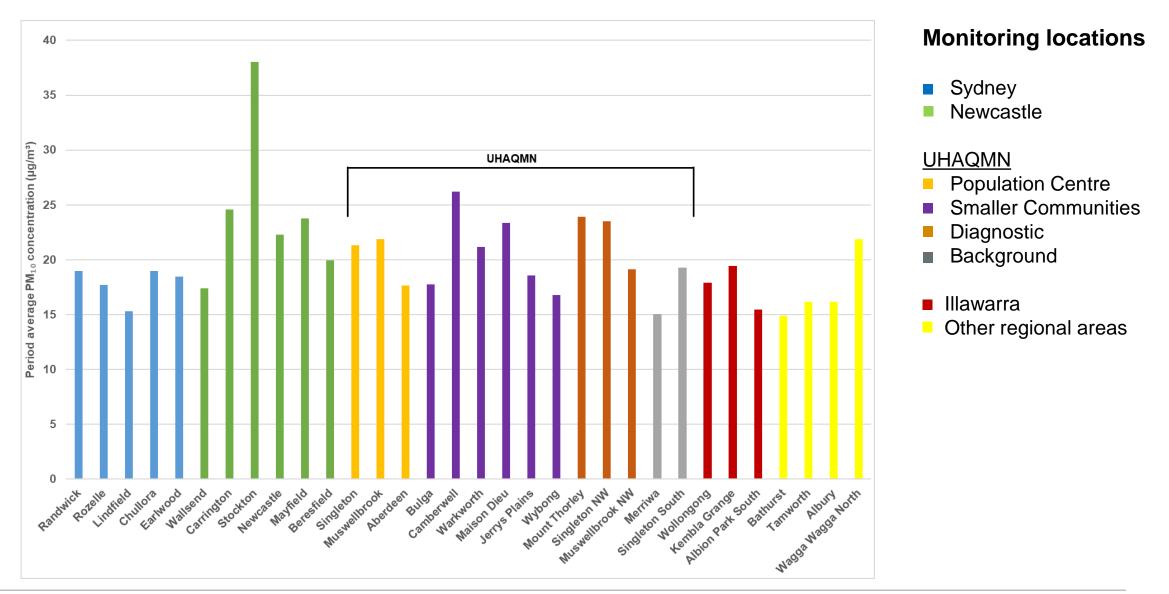
Smaller communities = Bulga, Camberwell, Warkworth, Maison Dieu, Jerry's Plains and Wybong

Diagnostic = Mount Thorley, Singleton NW, Muswellbrook NW

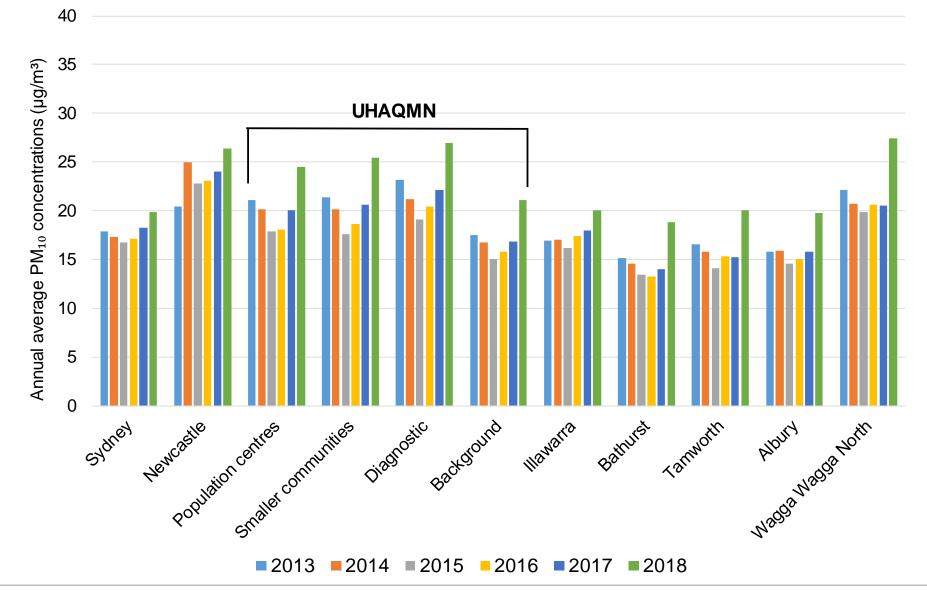
Background = Merriwa and Singleton South

Discussion of PM<sub>10</sub> Concentrations

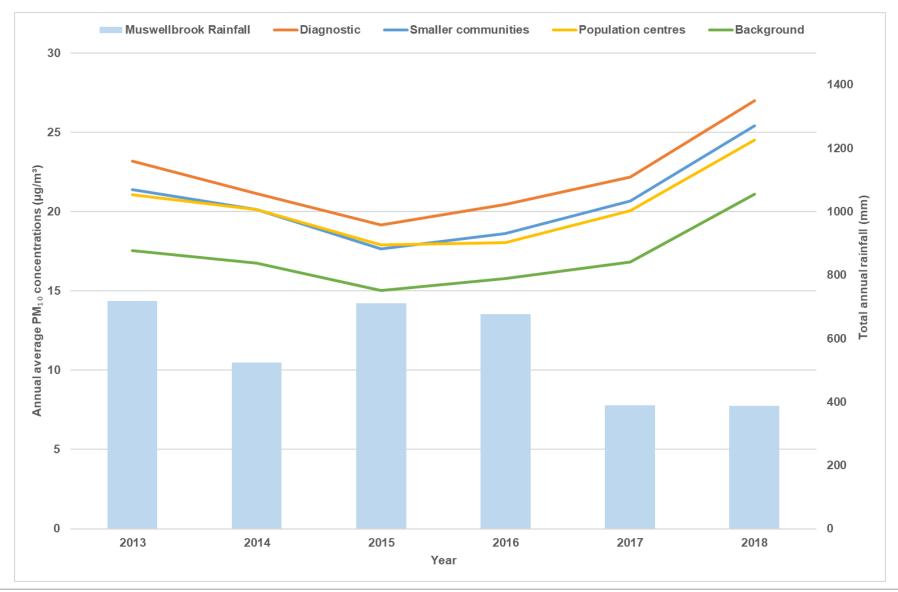
### **Comparison of period average PM<sub>10</sub> concentrations**



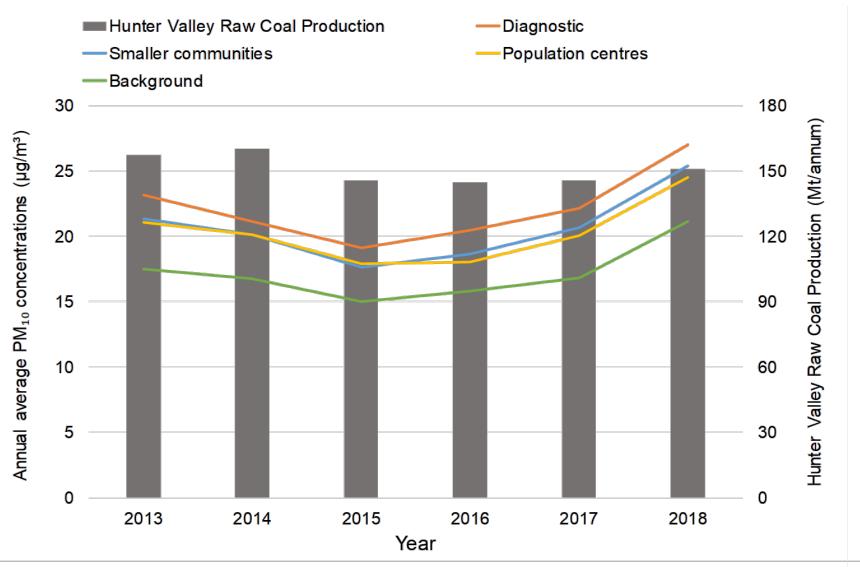
#### **Comparison of annual average PM<sub>10</sub> concentrations**



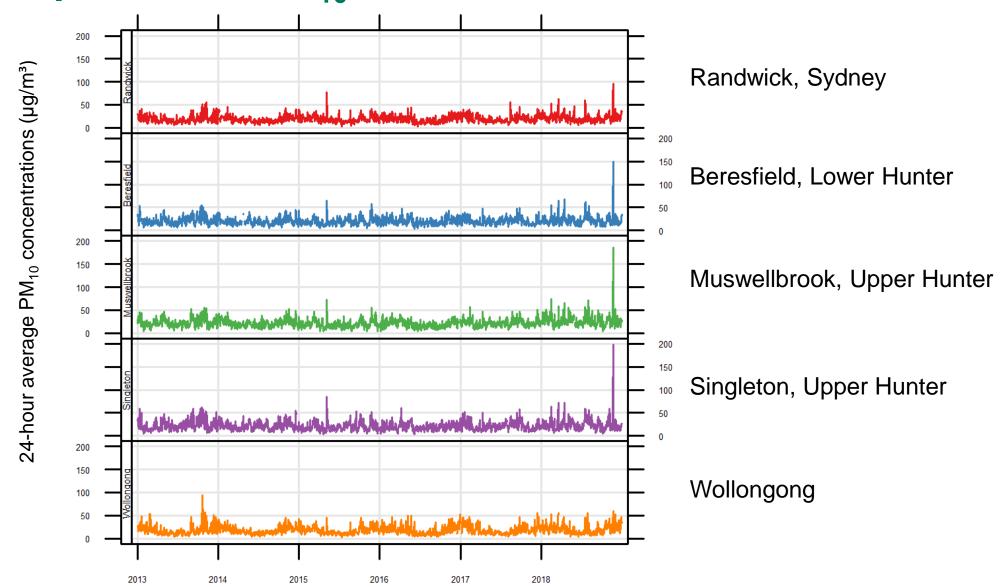
#### **Comparison of rainfall and Upper Hunter PM**<sub>10</sub>



#### **Comparison of coal production and Upper Hunter PM**<sub>10</sub>



#### **Comparison of PM<sub>10</sub> concentrations at selected sites**



#### PM<sub>10</sub> Calendar Plots for 2018

#### Randwick

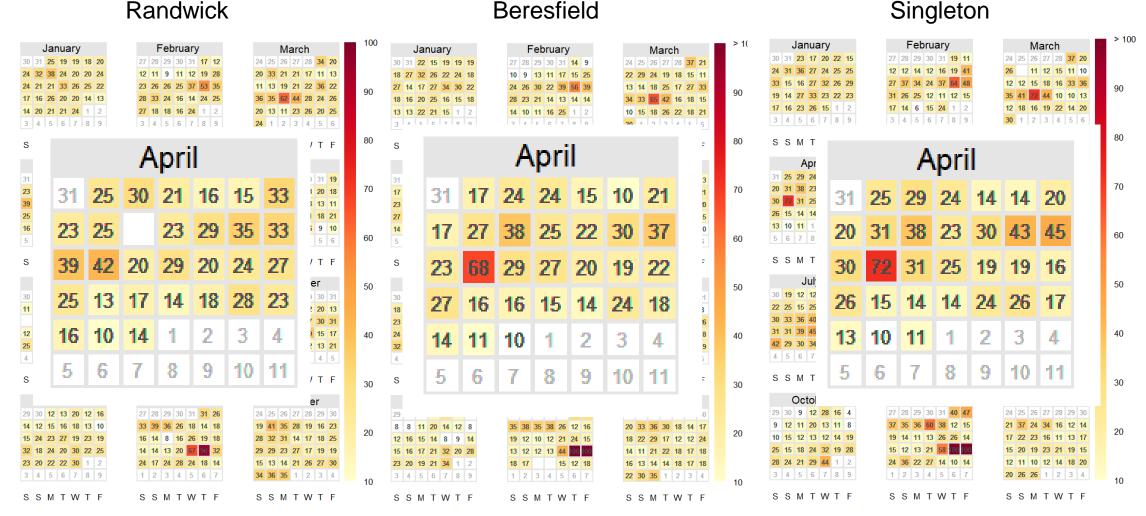
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  9         21           25         15         1         2         3         4         5           S         S         M         T         W         T         F           Control         Control         Control         Control         Control         Control         Control           24         25         26         27         28         29         30         21           24         25         26         27         28         29         30         21           24         25         26         27         28         29         30         21           21         37         24         34         46         12         14         14	40				
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 F           V         V         V         T         W         T         F           20         30         9         12         28         16         4           9         12         14         20         13         11         8           10         15         12         13         12         14         19           20	28         29         30         31         29         24         34           56         67         42         23         23         24           28         16         29         34         46         36         29           34         21         29         26         25         22         16           15         14         17         20         21         23         26           1         2         3         4         5         6         7           28         29         34         5         6         7         7           5         S         M         T         W         T         F           70         28         29         30         31         40         47         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Beresfield

Singleton

#### **April 2018**

Randwick



**Beresfield** 

### **July 2018**

Randwick

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#### Beresfield

#### Singleton

#### **November 2018**

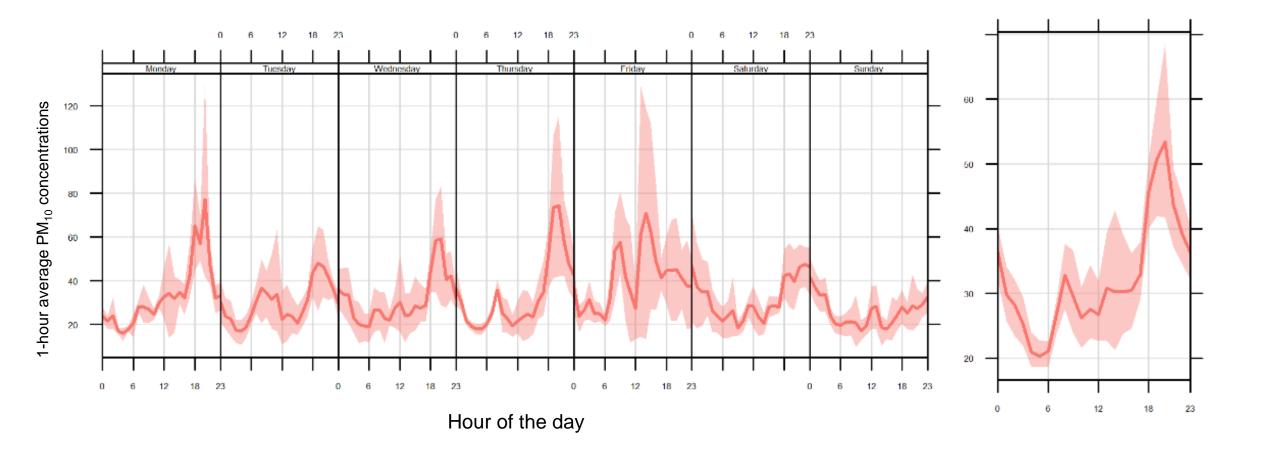
Randwick

Januarya           30         31         25         19         19         18         20           24         32         38         24         20         20         24           24         21         21         33         26         25         22           17         16         26         20         20         14         13           14         20         21         21         24         1         2           3         4         5         6	Image: Section 1                  <	100 90 80	Java Java Java Java Java Java Java Java	18     10     9     13     11     17     15     25       22     24     26     30     22     39     56     39       18     28     23     21     14     13     14     14       2     14     10     11     16     25     1     2				Value         Value <th< th=""><th>&gt; 10( 90</th><th>30         31         23         17         20           24         31         36         27         24           33         15         16         27         32           19         14         27         32         23           17         16         23         61         15           3         4         5         6         7</th><th colspan="4">FEBERESENENENENENENENENENENENENENENENENENEN</th><th></th><th>24     25     26       26     1     11       12     12     15       35     41     72       12     18     16</th><th>A         C         S</th><th>&gt; 100 90 80</th></th<>			> 10( 90	30         31         23         17         20           24         31         36         27         24           33         15         16         27         32           19         14         27         32         23           17         16         23         61         15           3         4         5         6         7	FEBERESENENENENENENENENENENENENENENENENENEN					24     25     26       26     1     11       12     12     15       35     41     72       12     18     16	A         C         S	> 100 90 80		
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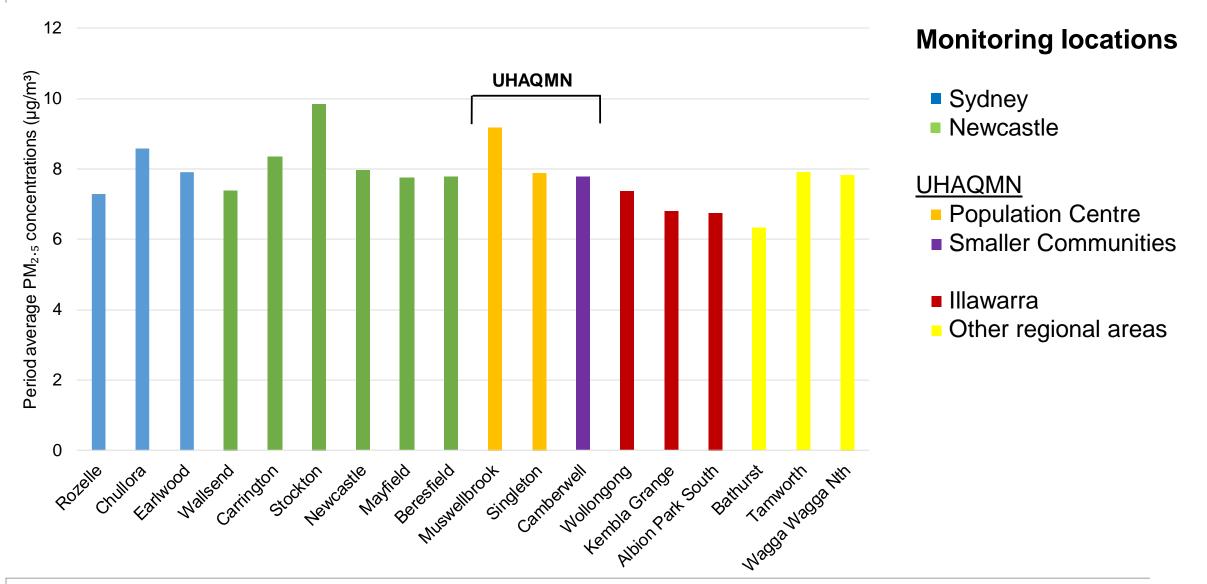
Singleton

### **PM<sub>10</sub> concentrations in Muswellbrook during May 2018**

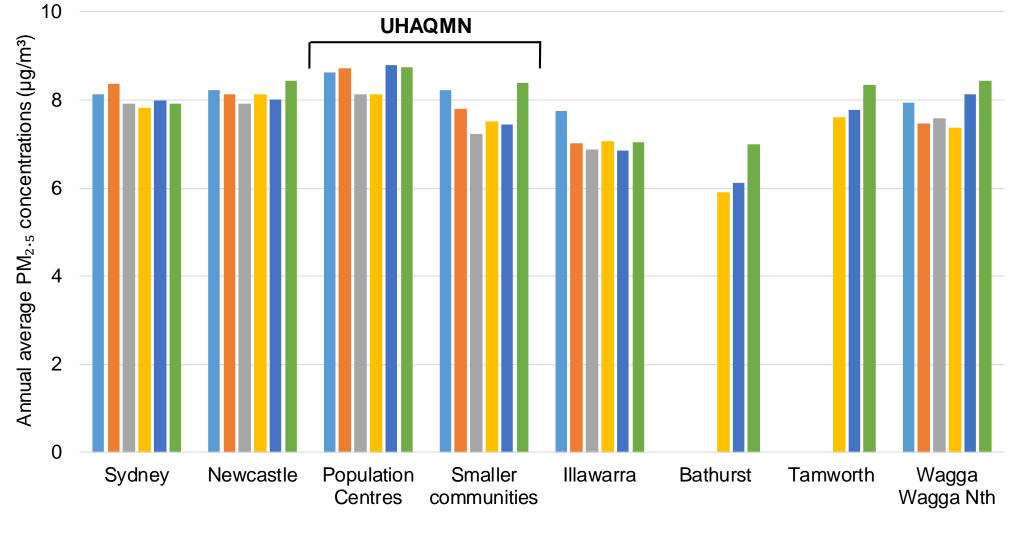


Discussion of PM<sub>2-5</sub> Concentrations

### **Comparison of period average PM2.5 concentrations**

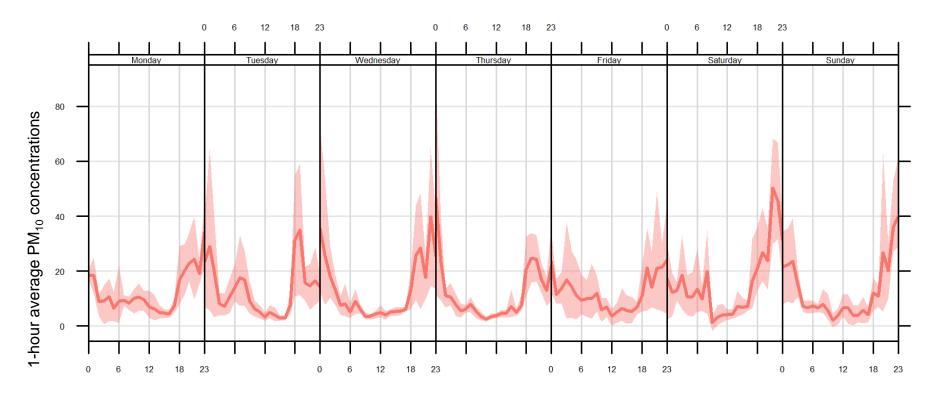


#### **Comparison of annual average PM2.5 concentrations**



■2013 ■2014 ■2015 ■2016 ■2017 ■2018

### **PM<sub>2.5</sub> concentrations in Muswellbrook during May 2018**



Hour of the day

#### **Summary**

#### 1. Has the air quality in the Upper Hunter changed since monitoring began?

- From 2013 to 2015 there were reductions in annual average  $PM_{10}$  and  $PM_{2.5}$  concentrations at most monitoring locations within the Upper Hunter.
- From 2015 to 2018 there were year-on-year increases in annual average  $PM_{10}$  and  $PM_{2.5}$  concentrations at almost all monitoring locations within the Upper Hunter.
- In 2018, there was a 45% reduction in total annual rainfall from 2015 levels.
- Annual trends appear to be more strongly correlated to rainfall than coal production.

#### **Summary**

# 2. Is the air quality in the Upper Hunter measured at the monitoring stations different from air quality measured at other locations in NSW?

- Since 2015, there has been a year-on-year increase in annual average PM<sub>10</sub> concentrations in Sydney, Newcastle, Upper Hunter and Illawarra.
- Elevated dust concentrations during 2018 were apparent across the Sydney GMR, Newcastle/Lower Hunter and the Upper Hunter with peaks evident across all regions.



## Thank you



The business of sustainability