

Appendix Two: Air Monitoring Equipment Table, Images and Maps

Equipment / Instrument to Monitors (Including key sites)	Description of Equipment	What does the instrument measure? Standard?	Operational Parameters: eg time lags, contingencies, automated data/manual	Date on which each were Logging and reporting data	Image
2 x Beta Attenuation Monitor (BAM)	EPA routine fixed site PM _{2.5} continuous monitoring system that requires 240 volts power, support infrastructure and shelter.	PM _{2.5} Instrument meets monitoring regulatory requirements for compliance monitoring against 24 hour advisory reporting standard	Automated with capability to log and remotely send data. Requires about 28-30 hours for warming up and collecting sufficient data to calculate 24 hour average	Morwell East -12 February (logging) 13 February (first data set available) Morwell South 19 February (logging) 20 February (first data set available)	See Image A
2 X Dustrak DRX	Portable solar powered battery operated system mounted on tripod at one location at a time. Readily be deployed in the field.	Estimated PM _{2.5} and/or visibility reduction. Requires a correlation factor to be applied to data to determine estimated PM2.5 levels. Correlation factor determined by comparing measurements to regulatory compliance monitor measurements Provides indicative assessment for compliance monitoring against 24 hour advisory reporting standard	Automated with capability to log and remotely send data. Requires less than 30 minutes to warm up	Morwell South 13 February – 9 April Morwell East 18 - 20 February, correlation study Morwell (Kernot Hall) 21 February – 3 March Morwell (United Anglican Church) 5 Mar – 15 March Morwell South 15 March – 9 April	See Image B

Appendix Two: Air Monitoring Equipment Table, Images and Maps

2 x Dustrak DRX – Travel-Blanket	Portable battery operated system that is mobile with sampling inlet that can be mounted on roof of car	Estimated PM _{2.5} and/or visibility reduction. Provides instantaneous indicative levels of a large spatial area and the extent of the smoke impact	Manual system, less than 30m minutes to warm up. Data needs to be down loaded and processed. Graphical mapping available.	Morwell township and surrounding area from 20 February – 31 March	See Image C
2 X ADR	Portable solar powered battery operated system mounted on tripod at one location at a time. Readily be deployed in the field.	Estimated PM _{2.5} and/or visibility reduction. Requires a correlation factor to be applied to data to determine estimated PM2.5 levels. Correlation factor determined by comparing measurements to regulatory compliance monitor measurements Provides indicative assessment for compliance monitoring against 24 hour advisory reporting standard	Automated with capability to log but remote data sending not configured for operation. Remote and requires less than 30m minutes to warm up	Morwell East 20 to 27 February correlation study Churchill 6 March continuing Morwell (Helen Street) 20 to 27 February Moe 28 February continuing I	
3 x Ecotech nephelometer	EPA routine visibility reduction continuous monitoring	Visibility reduction Instrument meets monitoring regulatory requirements for compliance monitoring against 1 air quality objective	Automated with capability to log and remotely send data. Requires about 2-4 hours for warming up and collecting sufficient data to calculate 24 hour average	Morwell East 13 February continuing Morwell South 20 February continuing Traralgon on-going	
1 X TEOM	EPA routine fixed site PM _{2.5}	PM ₁₀	Automated with	Traralgon on-going	

Appendix Two: Air Monitoring Equipment Table, Images and Maps

	continuous monitoring system that requires 240 volts power, support infrastructure and shelter.	Instrument meets monitoring regulatory requirements for compliance monitoring against 24 hour advisory reporting standard	capability to log and remotely send data. Requires about 28-30 hours for warming up and collecting sufficient data to calculate 24 hour average		
1 x Low sampler	Sampler collects 24 hours samples on filters. Filters sent for laboratory analysis Also used for short term – lab analysis sample collection	PM ₁₀ Instrument meets monitoring regulatory requirements for compliance monitoring against 24 hour advisory reporting standard	Automated sequential sampler that only collects one sample every 24 hours. Requires manual filter changes and laboratory weighing of filters	Morwell South 28 February- 26 March	
3 x Ecotech CO monitor	EPA routine CO continuous monitoring	CO Instrument meets monitoring regulatory requirements for compliance monitoring against 8 hour average quality objective	Automated with capability to log and remotely send data. Requires about 12 hours for warming up and collecting sufficient data to calculate 8 hour average	Morwell South 19 February continuing Morwell East 19 February continuing Traralgon 28 February continuing	
More 10 AreaRAE	CFA Portable CO occupational exposure monitoring	Indicative CO levels if have sufficient number of monitors can provide a network system over a spatial area and the extent of the CO levels	Automated sequential sampler requiring battery changing and manual checking. Capable of sending signal to base station. Base station as no capability to remotely send data.	Various locations in Morwell South 15 February – 5 March	See Image E
2 x Gas Badge Pro CO monitor	Personal CO occupational exposure monitoring	Indicative CO levels for spot checks at various locations	Manual monitor CO levels read directly off the monitor	Various locations in Morwell 13 February – 5 March	

Appendix Two: Air Monitoring Equipment Table, Images and Maps

3 x Ecotech Sulphur dioxide (SO ₂) monitor	EPA routine SO ₂ continuous monitoring	SO ₂ Instrument meets monitoring regulatory requirements for compliance monitoring against hourly and 24 hour air quality objective	Automated with capability to log and remotely send data. Requires about 2-4 hours for warming up and calibration	Morwell East 19 February continuing Morwell South 19 February continuing Traralgon on-going	
2 x Ecotech Nitrogen Dioxide (NO ₂) monitor	EPA routine NO ₂ continuous monitoring	NO ₂ Instrument meets monitoring regulatory requirements for compliance monitoring against hourly air quality objective	Automated with capability to log and remotely send data. Requires about 2-4 hours for warming up and calibration	Morwell South 6 March - continuing Traralgon on-going	
2 x Ecotech Ozone (O ₃) monitor	EPA routine O ₃ continuous monitoring	O ₃ Instrument meets monitoring regulatory requirements for compliance monitoring against hourly, 4 hours and 8 hourly air quality objective	Automated with capability to log and remotely send data. Requires about 2-4 hours for warming up and calibration	Morwell South 6 March – continuing Traralgon on-going	
3 x Vaisala meteorology monitor	EPA routine continuous meteorology monitoring	Instrument meets monitoring regulatory requirements for compliance monitoring	Automated with capability to log and remotely send data. Ready to operate when installed and checked it is operating properly	Morwell East -13 February continuing Morwell South 19 February continuing Traralgon on-going	
Sampling equipment	Description				
4 x Canisters	1 type supplied by laboratory at 3 EPA sites & 1 type CSIRO site	High smoke event sampling over 24 hour period for a range of	Manual sampling requiring samplers to be changed before and after	Morwell East, Morwell South, Maryvale Crescent on 8 different days from 26	See Image F & Image G

Appendix Two: Air Monitoring Equipment Table, Images and Maps

		Volatile organic compounds (62)	sampling period.	February.	
4 x Adsorbent tubes	2 different specific tubes supplied by laboratory at 3 EPA sites 1 type CSIRO site				See Image F & Image G
2/3 x Low volume sampler	1 x EPA sampler & 1/2 x CSIRO sampler				See Image F & Image G
2 x Hi-volume sampler	x EPA & 1 X CSIRO				See Image F & Image G

Appendix Two: Air Monitoring Equipment Table, Images and Maps

Images referenced in Air Monitoring Equipment used by EPA during the Hazelwood Mine Fire Table

Image A

12 March 2014 Fixed monitoring station - Morwell East

A – Sample inlet for monitoring CO and other gas pollutants

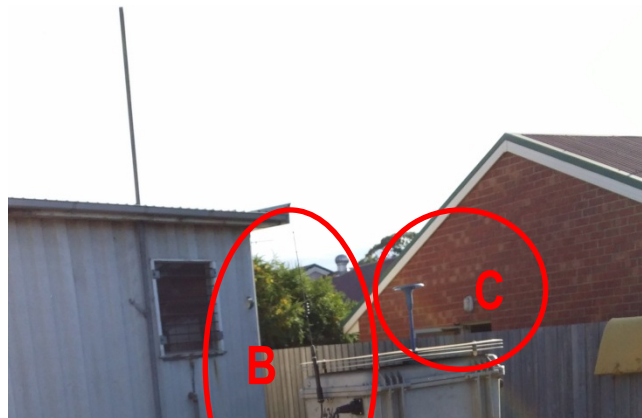
B – BAM PM2.5 sample inlet

C – NBN BEIP project trial unit. Not part of EPA response to Hazelwood Mine Fire



Image B

10 March 2014 Dustrak DRX - Uniting Anglican Church



Appendix Two: Air Monitoring Equipment Table, Images and Maps

A – Solar panel
B – Dustrak Antenna
C – Dustrak Sampling Inlet

Image C

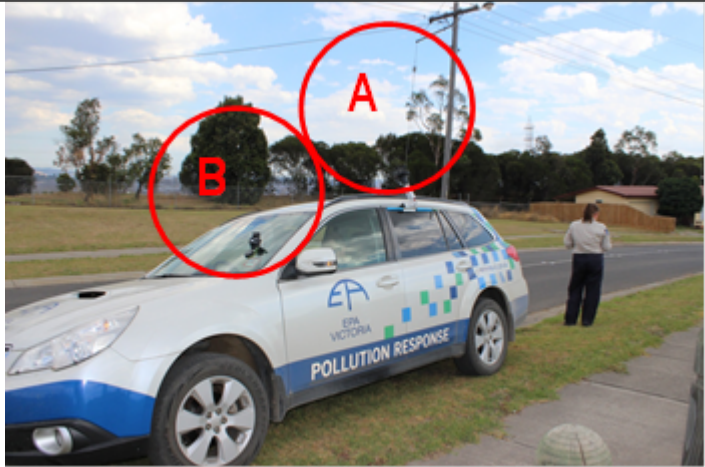
Clockwise, starting from top left:

4 March 2014 - TravelBLANKET Probe (Equipment attached to car to detect wind spend/direction and particulates)

4 March 2014 – EPA vehicle with personal CO monitor and TravelBLANKET probe

4 March 2014 - TravelBLANKET software (computer system)

4 March 2014 – Personal portable CO monitors



B Appendix Two: Air Monitoring Equipment Table, Images and Maps

A – TravelBLANKET probe

B – Personal portable CO monitors

C - TravelBLANKET software (computer system)

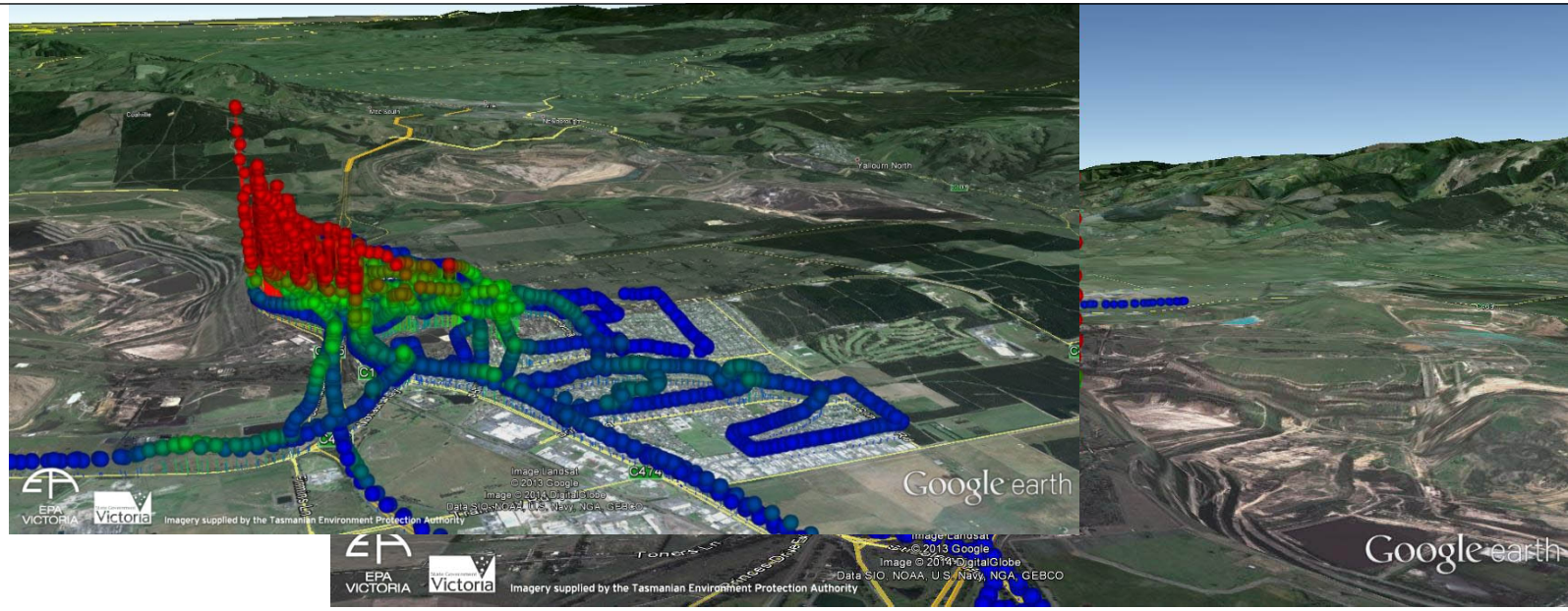


22 Feb 2014 - Image of Morwell using TravelBLANKET Data. Height and colour represent concentration of fine particles measured where the colour (blue to red) and height of each marker above the ground represents the concentration of fine particles measured. Red to blue (high to low concentrations)

Oblique looking west

Oblique looking east

Appendix Two: Air Monitoring Equipment Table, Images and Maps

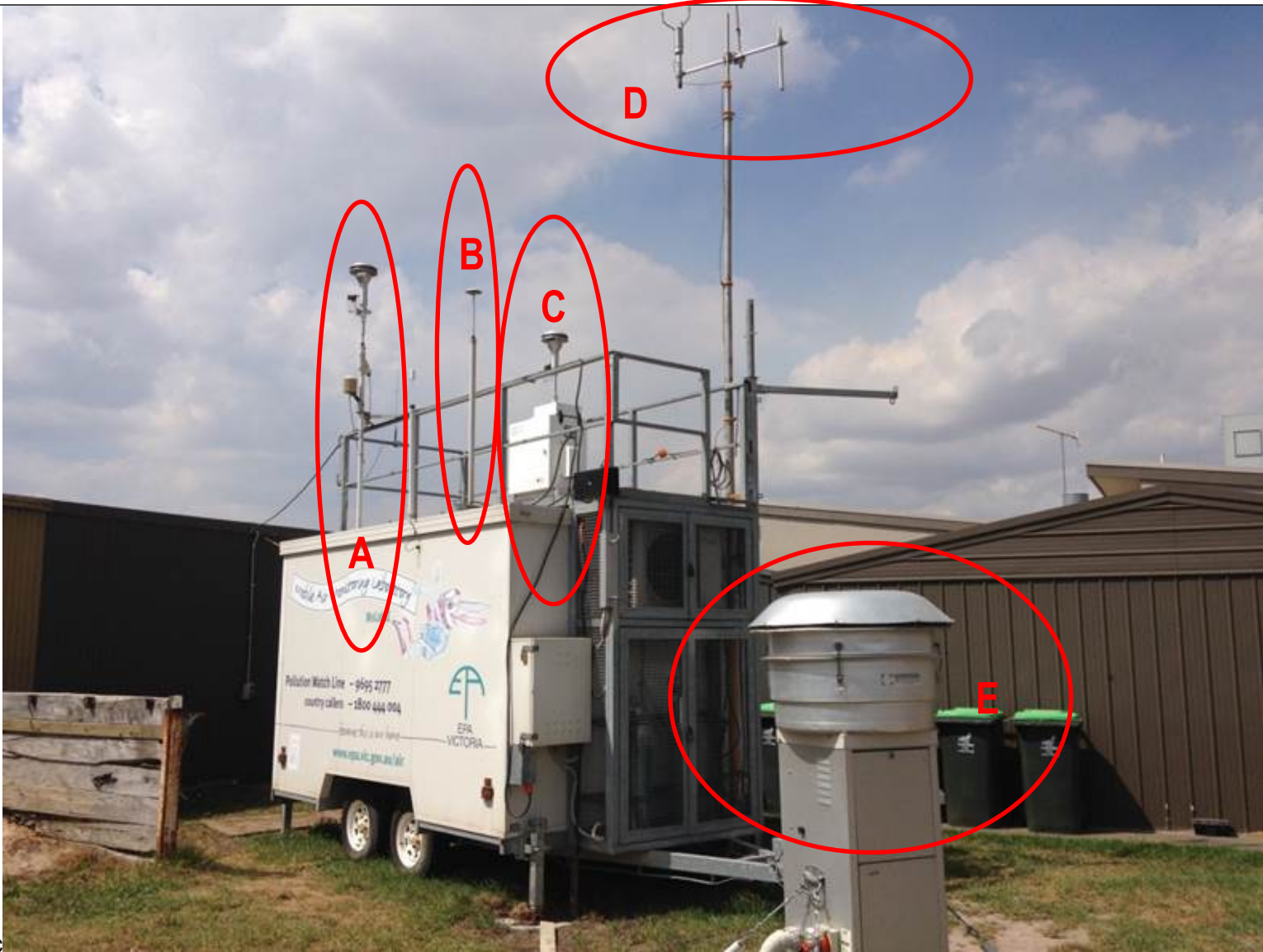


Planning view

Appendix Two: Air Monitoring Equipment Table, Images and Maps

Image D
16 March 2014 Morwell
South – Molab

- A – BAM PM2.5 sample inlet
- B – Sample inlet for monitoring CO and other gas pollutants
- C – PM10 Low volume sampler
- D – Wind monitor
- E – Hi-Volume sampler - PM10



c

Appendix Two: Air Monitoring Equipment Table, Images and Maps

Image E

4 March 2014 Area
RAE MFB Monitor -
Morwell Bowls Club -
Morwell South



B

Image F

Clockwise, starting
from top left:

4 March 2014
Maryvale Crescent



Appendix Two: Air Monitoring Equipment Table, Images and Maps

<p><i>Morwell South – VOC Canisters sit in bucket & VOC tube under the bucket</i></p> <p><i>8 March 2014 Morwell South - Hi-Volume sampler - PM10 (Hi- Volume sampler PM10)</i></p>	
---	--

Appendix Two: Air Monitoring Equipment Table, Images and Maps

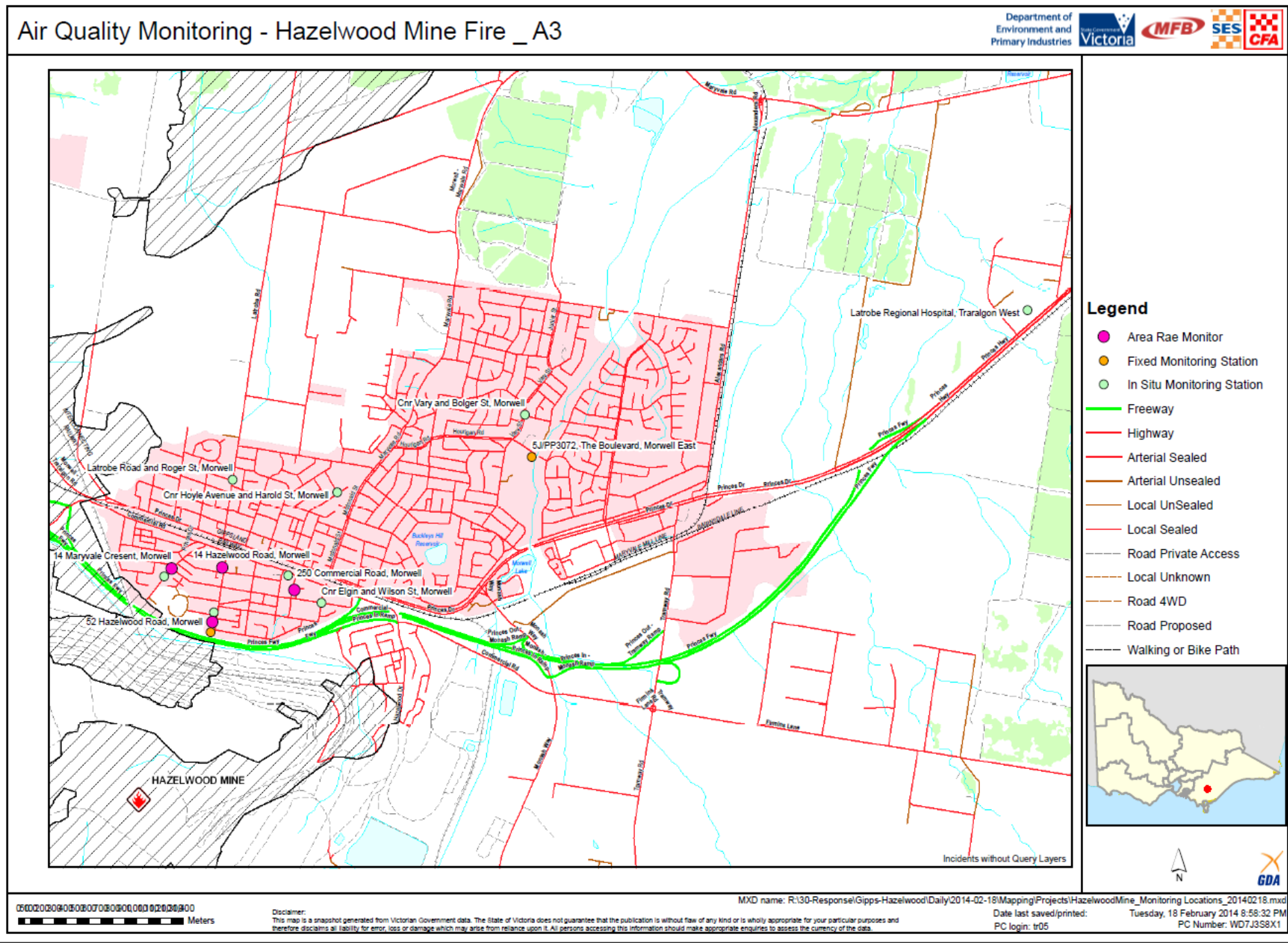
Image G

*11 March 2014 Morwell
South (Morwell
Common) - CSIRO
monitoring equipment*



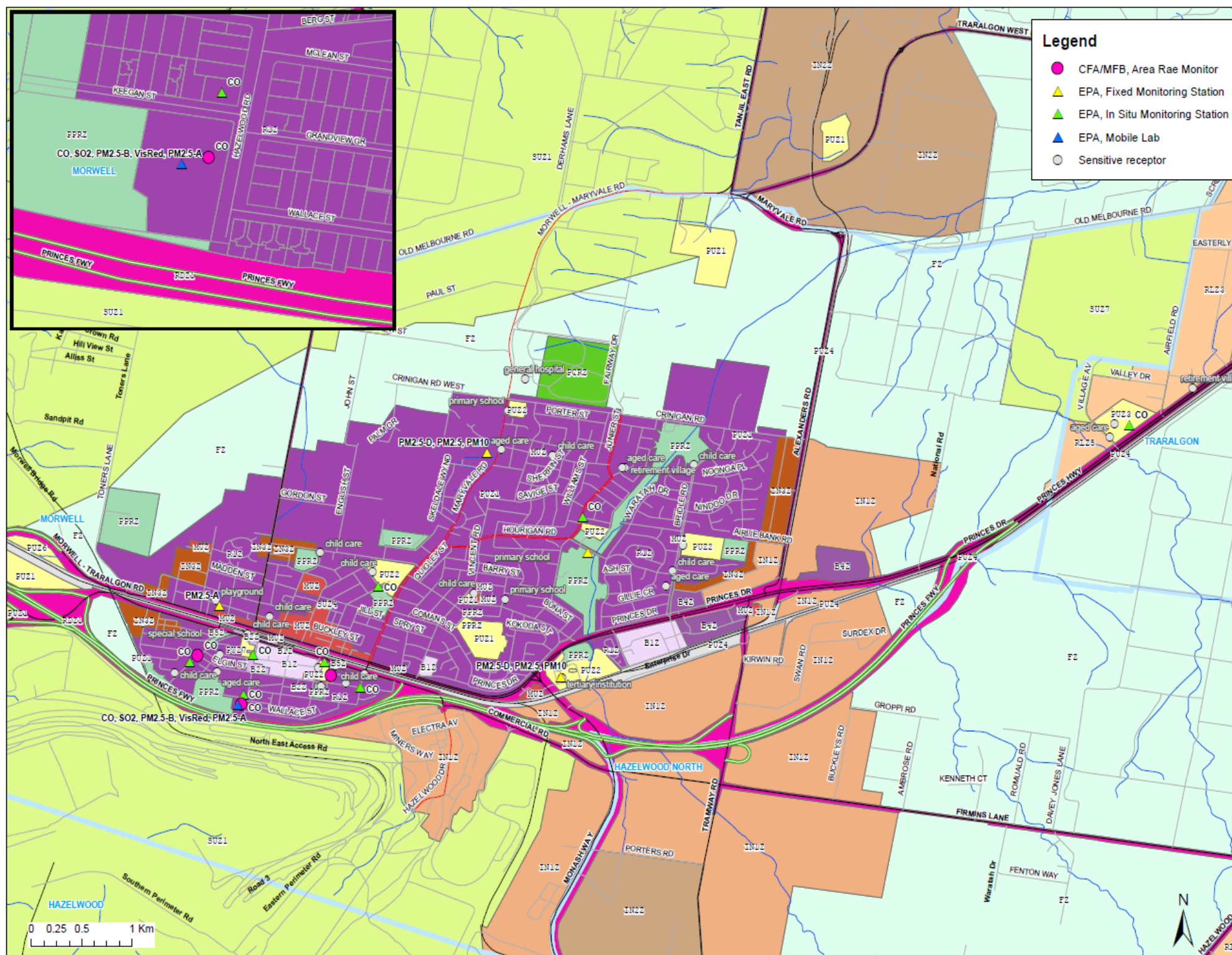
Appendix Two: Air Monitoring Equipment Table, Images and Maps

Name of Map	Date Range it relates to	What it contains
18 Feb 2014 Hazelwood Mine Fire Map (Monitoring)	18 Feb to 20 Feb	Provides information on <ul style="list-style-type: none"> - Area Rae - Fixed and - In situ monitoring (Portable instruments)



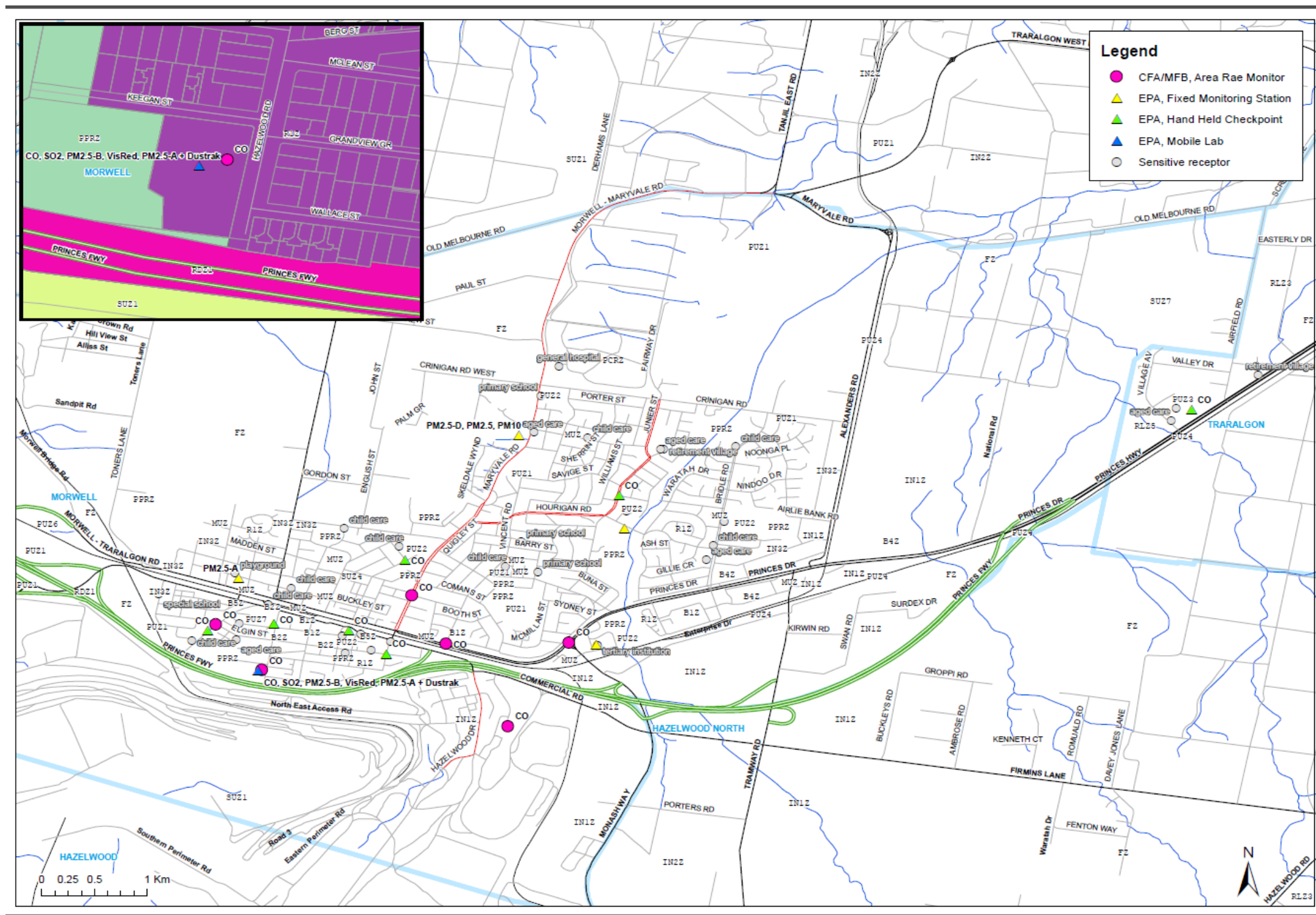
Appendix Two: Air Monitoring Equipment Table, Images and Maps

Name of Map	Date Range it relates to	What it contains
21 Feb 2014 Hazelwood Mine Fire Map (Monitoring and sensitive receptors)	21 Feb to 24 Feb	Monitoring sites and sensitive receptors broken down by EPA and CFA/MFB



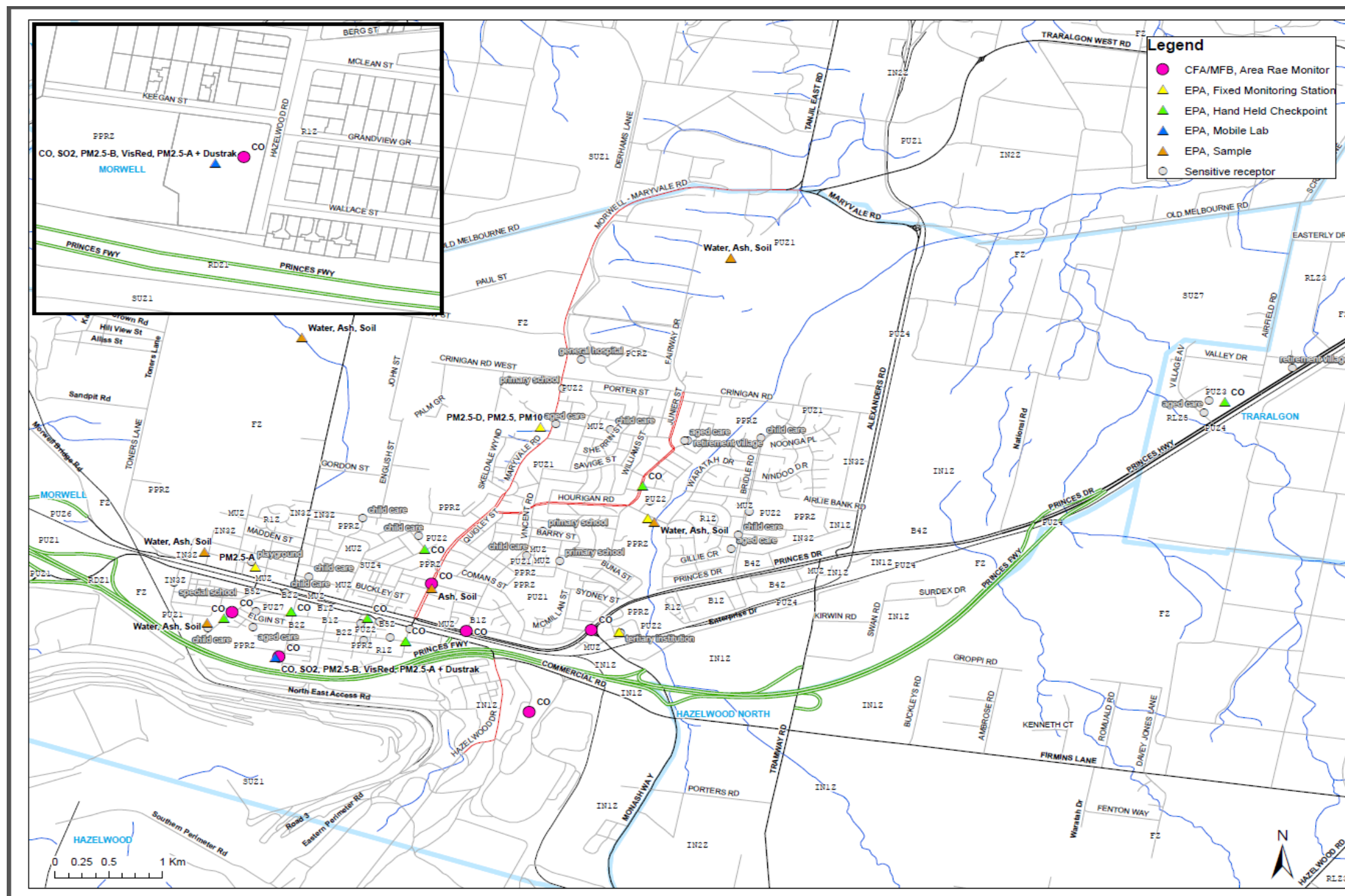
Appendix Two: Air Monitoring Equipment Table, Images and Maps

Name of Map	Date Range it relates to	What it contains
24 Feb 2014 Hazelwood Mine Fire Map (Monitoring and sensitive receptors)	24 Feb	Monitoring sites and sensitive receptors, broken down by EPA and CFA/MFB



Appendix Two: Air Monitoring Equipment Table, Images and Maps

Name of Map	Date Range it relates to	What it contains
25 Feb 2014 Hazelwood Mine Fire Map (Monitoring, sensitive receptors and samples)	25 Feb to 3 March	Monitoring sites, sensitive receptors and sample locations, broken down by EPA and CFA/MFB



Appendix Two: Air Monitoring Equipment Table, Images and Maps

Name of Map	Date Range it relates to	What it contains
4 March 2014 Hazelwood Mine Fire Map (Monitoring and samples)	4 March to 15 March	Monitoring sites and sample locations, broken down by EPA and CFA/MFB

The map displays the Hazelwood area, including Morwell and Hazelwood North. Key features include:

- Inset Map:** Shows Morwell with monitoring sites for CO, SO₂, PM_{2.5}-B, VisRed, PM_{2.5}-A + Dustrak, and a CFA/MFB Area Rae Monitor.
- Main Map:** Shows monitoring sites for PM_{2.5}-D, PM_{2.5}, PM₁₀, Ash, Soil, Water, Ash, Soil, and CO. It also indicates locations for EPA Fixed Monitoring Stations, Hand Held Checkpoints, Mobile Labs, and EPA Samples.
- Legend:**
 - CFA/MFB, Area Rae Monitor
 - ▲ EPA, Fixed Monitoring Station
 - ▲ EPA, Hand Held Checkpoint
 - ▲ EPA, Mobile Lab
 - ▲ EPA, Sample
- Scale:** 0, 0.25, 0.5, 1 Km
- Orientation:** North arrow pointing up.

Appendix Two: Air Monitoring Equipment Table, Images and Maps

Name of Map	Date Range it relates to	What it contains
16 March 2014 Hazelwood Mine Fire Map (Sample and instrument locations)	16 March to 18 March	Instrument and sample locations



Appendix Two: Air Monitoring Equipment Table, Images and Maps

Name of Map	Date Range it relates to	What it contains
19 March 2014 Hazelwood Mine Fire Map (Sample and instrument locations)	19 March – Current as of date of submission	Instrument and sample locations

