



**Australian Government**  
**Bureau of Meteorology**

**Head Office Melbourne**  
Bureau of Meteorology  
GPO Box 1289 Melbourne VIC 3001 Australia

**Justine Stansen**  
**Hazelwood Mine Fire Enquiry**  
**PO Box 3460**  
**GIPPSLAND**  
**VIC 3841**

Attention: **Justine Stansen**

Dear Madam,

I refer to your correspondence dated 14 May 2014, requesting information about the weather conditions in the Morwell area on 9 February 2014.

Please find enclosed certified Automatic Weather Observations on 9 February 2014 for the Bureau of Meteorology weather reporting sites Morwell (Latrobe Valley Airport) and Nilma North (Warragul).

Please also find enclosed certified copies of the Fire Weather Warnings issued by the Bureau of Meteorology for Victoria between 3 and 9 February 2014. Note that Morwell is in the West and South Gippsland Forecast District.

Included in Appendix A is a table with station details for the Bureau sites used to prepare this report. Information to assist with your interpretation of the weather observations, forecasts and warnings provided is included in Appendix B.

A copy of the Beaufort Wind Scale, which provides a reference for wind speed, is included in Appendix C.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Patrick Ward'.

Patrick Ward  
Meteorologist, Climate Information Services  
Bureau of Meteorology

03 June 2014



In reply please quote

**Certified Extract No. E62D394A91-1**

**Justine Stansen**  
**Hazelwood Mine Fire Enquiry**  
**PO Box 3460**  
**GIPPSLAND**  
**VIC 3841**

03 June 2014

**CERTIFIED EXTRACT**  
**EVIDENCE ACT 1995 SECTION 155**

**FROM THE OFFICIAL METEOROLOGICAL RECORDS OF THE**  
**COMMONWEALTH OF AUSTRALIA**

I, **Patrick Ward**, Meteorologist, Climate Information Services, Western Australia Regional Office, Perth, Commonwealth Bureau of Meteorology, HEREBY CERTIFY that the data provided on the attached pages numbered 3 to 13 are true extracts from the Computer Archives of the Bureau of Meteorology, which said records are official meteorological records of the Commonwealth of Australia, and I FURTHER CERTIFY that I am an Officer to whose custody the said records are entrusted.

SIGNED BY the said **Patrick Ward** at Western Australia Regional Office, Perth on 03 June 2014.

3/6/14

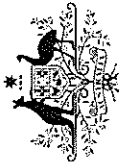


Certified Extract No. E62D394A91-1

Automatic Weather Observations

Morwell (Latrobe Valley Airport) (Site No. 85280)										
Date	Time (LCT)	Rain since 9am (mm)	Air Temperature (°C)	Dewpoint Temperature (°C)	Relative Humidity (%)	Wind Speed (km/h)	Wind Direction (degrees)	Wind Gust (km/h)	MSL Pressure (hPa)	
09/02/2014	12:00 AM	0.0	22.8	13.6	56	9	070	13	1008.8	
09/02/2014	12:30 AM	0.0	22.9	13.7	56	9	060	11	1008.7	
09/02/2014	01:00 AM	0.0	21.3	14.7	66	2	050	8	1008.6	
09/02/2014	01:30 AM	0.0	19.8	15.2	75	4	010	8	1008.4	
09/02/2014	02:00 AM	0.0	20.0	15.4	75	9	040	11	1008.0	
09/02/2014	02:30 AM	0.0	19.9	14.9	73	9	080	11	1007.8	
09/02/2014	03:00 AM	0.0	21.0	14.4	66	9	070	13	1007.7	
09/02/2014	03:30 AM	0.0	18.1	14.4	79	5	360	8	1007.4	
09/02/2014	04:00 AM	0.0	18.7	14.6	77	9	060	13	1007.4	
09/02/2014	04:30 AM	0.0	18.5	15.0	80	11	050	15	1007.2	
09/02/2014	05:00 AM	0.0	18.1	14.0	77	9	270	17	1007.7	
09/02/2014	05:30 AM	0.0	18.9	14.2	74	8	210	9	1007.9	
09/02/2014	06:00 AM	0.0	17.5	14.4	82	2	310	8	1007.9	
09/02/2014	06:30 AM	0.0	17.9	14.4	80	2	070	8	1008.0	
09/02/2014	07:00 AM	0.0	16.2	13.9	86	4	200	9	1008.2	
09/02/2014	07:30 AM	0.0	18.1	15.0	82	4	220	9	1008.1	
09/02/2014	08:00 AM	0.0	20.7	15.9	74	9	260	15	1008.1	
09/02/2014	08:21 AM	0.0	25.7	14.2	49	8	210	11	1007.9	
09/02/2014	08:30 AM	0.0	27.1	13.1	42	5	200	9	1008.0	
09/02/2014	08:54 AM	0.0	32.2	8.4	23	11	220	21	1007.7	
09/02/2014	09:00 AM	0.0	33.0	8.5	22	8	180	17	1007.6	

P.W



**Morwell (Latrobe Valley Airport) (Site No. 85280)**

Date	Time (LCT)	Rain since 9am (mm)	Air Temperature (°C)	Dewpoint Temperature (°C)	Relative Humidity (%)	Wind Speed (km/h)	Wind Direction (degrees)	Wind Gust (km/h)	MSL Pressure (hPa)
09/02/2014	09:30 AM	0.0	36.4	7.4	17	13	270	28	1007.4
09/02/2014	09:50 AM	0.0	37.5	4.4	13	28	330	48	1007.2
09/02/2014	10:00 AM	0.0	37.7	3.4	12	37	330	76	1007.0
09/02/2014	10:30 AM	0.0	37.6	3.4	12	44	330	70	1006.4
09/02/2014	10:52 AM	0.0	38.3	5.0	13	37	360	67	1006.1
09/02/2014	10:59 AM	0.0	37.8	3.5	12	42	350	63	1006.2
09/02/2014	11:00 AM	0.0	37.9	3.6	12	44	350	63	1006.1
09/02/2014	11:30 AM	0.0	39.3	5.8	13	24	340	55	1006.6
09/02/2014	11:33 AM	0.0	38.8	5.4	13	28	340	46	1006.4
09/02/2014	12:00 PM	0.0	39.0	4.4	12	33	320	50	1006.3
09/02/2014	12:24 PM	0.0	39.8	5.1	12	31	330	50	1006.3
09/02/2014	12:30 PM	0.0	39.6	4.9	12	35	310	50	1006.3
09/02/2014	12:38 PM	0.0	40.5	5.6	12	35	310	54	1006.3
09/02/2014	01:00 PM	0.0	40.0	4.0	11	37	320	57	1006.4
09/02/2014	01:30 PM	0.0	40.0	4.0	11	33	320	57	1006.0
09/02/2014	01:47 PM	0.0	33.8	14.8	32	42	250	63	1007.2
09/02/2014	01:52 PM	0.0	29.3	15.1	42	41	210	63	1007.2
09/02/2014	01:56 PM	0.0	28.2	15.1	45	46	220	74	1007.5
09/02/2014	01:57 PM	0.0	27.9	15.2	46	48	220	74	1007.5
09/02/2014	02:00 PM	0.0	29.5	15.6	43	50	220	74	1007.4
09/02/2014	02:28 PM	0.0	26.5	15.2	50	55	220	68	1009.5
09/02/2014	02:30 PM	0.0	26.8	15.2	49	55	230	68	1009.6
09/02/2014	02:31 PM	0.0	26.9	15.3	49	55	230	68	1009.6
09/02/2014	02:38 PM	0.0	26.8	14.5	47	50	230	68	1010.1
09/02/2014	03:00 PM	0.0	24.5	13.4	50	52	220	67	1010.8
09/02/2014	03:30 PM	0.0	24.0	12.3	48	50	220	67	1011.5
09/02/2014	03:38 PM	0.0	23.0	11.7	49	52	230	70	1011.6

P.w.



Morwell (Latrobe Valley Airport) (Site No. 85280)										
Date	Time (LCT)	Rain since 9am (mm)	Air Temperature (°C)	Dewpoint Temperature (°C)	Relative Humidity (%)	Wind Speed (km/h)	Wind Direction (degrees)	Wind Gust (km/h)	MSL Pressure (hPa)	
09/02/2014	04:00 PM	0.0	23.2	11.6	48	48	230	67	1012.1	
09/02/2014	04:30 PM	0.0	23.4	10.8	45	52	240	65	1012.5	
09/02/2014	04:31 PM	0.0	23.3	10.7	45	52	240	65	1012.4	
09/02/2014	04:45 PM	0.0	22.6	10.4	46	54	240	68	1012.5	
09/02/2014	05:00 PM	0.0	22.4	9.6	44	54	240	67	1012.5	
09/02/2014	05:30 PM	0.0	22.4	9.2	43	52	240	65	1013.2	
09/02/2014	05:58 PM	0.0	22.3	7.7	39	48	240	65	1013.6	
09/02/2014	06:00 PM	0.0	22.7	7.3	37	48	240	63	1013.7	
09/02/2014	06:04 PM	0.0	22.4	6.6	36	46	240	67	1013.8	
09/02/2014	06:30 PM	0.0	21.4	7.3	40	50	240	65	1014.4	
09/02/2014	06:37 PM	0.0	21.3	7.5	41	52	240	65	1014.7	
09/02/2014	07:00 PM	0.0	21.2	7.1	40	41	250	55	1015.3	
09/02/2014	07:06 PM	0.0	21.0	7.3	41	42	250	54	1015.5	
09/02/2014	07:30 PM	0.0	20.3	7.0	42	41	240	57	1016.4	
09/02/2014	08:00 PM	0.0	19.6	6.0	41	35	250	44	1017.1	
09/02/2014	08:02 PM	0.0	19.5	5.9	41	35	240	55	1017.2	
09/02/2014	08:30 PM	0.0	18.9	6.7	45	28	250	41	1018.1	
09/02/2014	09:00 PM	0.0	18.2	6.4	46	24	250	35	1019.0	
09/02/2014	09:30 PM	0.0	17.6	5.9	46	28	240	42	1019.8	
09/02/2014	10:00 PM	0.0	16.8	6.9	52	18	260	24	1020.3	
09/02/2014	10:30 PM	0.0	16.5	7.2	54	21	270	26	1020.3	
09/02/2014	11:00 PM	0.0	15.6	7.1	57	18	270	22	1020.3	
09/02/2014	11:30 PM	0.0	15.6	7.4	58	18	280	24	1020.3	
10/02/2014	12:00 AM	0.0	14.9	7.2	60	13	270	17	1020.3	

P.W.

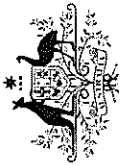


Certified Extract No. E62D394A91-1

Automatic Weather Observations

Nilma North (Warragul) (Site No. 85313)										
Date	Time (LCT)	Rain since 9am (mm)	Air Temperature (°C)	Dewpoint Temperature (°C)	Relative Humidity (%)	Wind Speed (km/h)	Wind Direction (degrees)	Wind Gust (km/h)	MSL Pressure (hPa)	
09/02/2014	12:00 AM	0.0	23.6	14.6	57	4	100	9	1008.1	
09/02/2014	12:30 AM	0.0	23.3	14.6	58	8	100	11	1007.9	
09/02/2014	01:00 AM	0.0	23.5	14.8	58	8	070	13	1007.7	
09/02/2014	01:30 AM	0.0	22.8	14.1	58	8	070	11	1007.5	
09/02/2014	02:00 AM	0.0	22.6	14.2	59	9	060	13	1007.0	
09/02/2014	02:30 AM	0.0	22.9	13.9	57	9	060	13	1006.8	
09/02/2014	03:00 AM	0.0	21.9	14.8	64	8	200	11	1007.1	
09/02/2014	03:30 AM	0.0	20.6	14.5	68	8	100	9	1006.8	
09/02/2014	04:00 AM	0.0	20.4	14.5	69	9	060	11	1006.7	
09/02/2014	04:10 AM	0.0	25.8	11.6	41	9	030	17	1006.4	
09/02/2014	04:16 AM	0.0	30.8	7.9	24	15	010	28	1006.1	
09/02/2014	04:30 AM	0.0	31.6	5.9	20	15	010	26	1006.0	
09/02/2014	05:00 AM	0.0	32.2	4.9	18	17	350	30	1006.3	
09/02/2014	05:30 AM	0.0	31.9	4.6	18	13	360	24	1006.4	
09/02/2014	06:00 AM	0.0	31.7	5.3	19	15	360	30	1006.6	
09/02/2014	06:30 AM	0.0	31.9	5.4	19	17	360	31	1006.6	
09/02/2014	07:00 AM	0.0	31.9	5.4	19	21	360	35	1006.6	
09/02/2014	07:30 AM	0.0	32.1	5.6	19	18	360	33	1006.6	
09/02/2014	08:00 AM	0.0	32.5	5.1	18	21	360	42	1006.9	
09/02/2014	08:30 AM	0.0	33.0	5.5	18	24	360	42	1006.7	
09/02/2014	09:00 AM	0.0	34.0	5.5	17	24	350	48	1006.9	

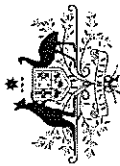
P.W.



**Nilma North (Warragul) (Site No. 85313)**

Date	Time (LCT)	Rain since 9am (mm)	Air Temperature (°C)	Dewpoint Temperature (°C)	Relative Humidity (%)	Wind Speed (km/h)	Wind Direction (degrees)	Wind Gust (km/h)	MSL Pressure (hPa)
09/02/2014	09:14 AM	0.0	34.6	5.1	16	28	340	50	1007.1
09/02/2014	09:30 AM	0.0	34.9	5.4	16	26	350	46	1007.0
09/02/2014	09:53 AM	0.0	35.4	4.8	15	28	350	54	1006.6
09/02/2014	10:00 AM	0.0	36.0	6.2	16	28	350	54	1006.5
09/02/2014	10:30 AM	0.0	36.5	5.7	15	26	350	52	1006.2
09/02/2014	10:33 AM	0.0	36.4	5.6	15	28	350	52	1006.2
09/02/2014	11:00 AM	0.0	37.3	6.3	15	24	330	44	1006.4
09/02/2014	11:08 AM	0.0	37.2	6.3	15	28	330	50	1006.6
09/02/2014	11:30 AM	0.0	38.0	5.9	14	24	330	39	1006.4
09/02/2014	11:35 AM	0.0	37.8	5.7	14	28	320	46	1006.3
09/02/2014	12:00 PM	0.0	38.4	6.2	14	28	310	61	1006.3
09/02/2014	12:30 PM	0.0	38.6	6.3	14	30	320	54	1006.3
09/02/2014	01:00 PM	0.0	39.0	6.7	14	31	310	54	1006.1
09/02/2014	01:16 PM	0.0	33.4	11.9	27	33	260	52	1007.1
09/02/2014	01:17 PM	0.0	32.5	12.7	30	31	260	52	1007.3
09/02/2014	01:25 PM	0.0	27.5	15.5	48	33	240	63	1008.4
09/02/2014	01:30 PM	0.0	26.4	15.4	51	33	240	63	1008.9
09/02/2014	02:00 PM	0.0	25.7	16.0	55	24	240	48	1010.7
09/02/2014	02:08 PM	0.0	24.9	15.8	57	28	240	50	1010.9
09/02/2014	02:30 PM	0.0	23.8	14.8	57	26	240	46	1011.2
09/02/2014	02:33 PM	0.0	23.8	14.5	56	28	240	48	1011.3
09/02/2014	03:00 PM	0.0	22.9	13.4	55	28	240	50	1012.1
09/02/2014	03:30 PM	0.0	21.8	12.1	54	24	240	44	1013.4
09/02/2014	04:00 PM	0.0	21.7	11.4	52	21	230	39	1013.9
09/02/2014	04:30 PM	0.0	21.2	11.0	52	24	240	41	1014.5
09/02/2014	05:00 PM	0.0	22.6	10.1	45	21	250	35	1014.9
09/02/2014	05:30 PM	0.0	22.0	8.9	43	17	230	28	1015.1

P.W.



Nilima North (Warragul) (Site No. 85313)

Date	Time (LCT)	Rain since 9am (mm)	Air Temperature (°C)	Dewpoint Temperature (°C)	Relative Humidity (%)	Wind Speed (km/h)	Wind Direction (degrees)	Wind Gust (km/h)	MSL Pressure (hPa)
09/02/2014	06:00 PM	0.0	22.2	8.7	42	18	240	33	1015.6
09/02/2014	06:30 PM	0.0	21.6	8.8	44	18	240	31	1016.0
09/02/2014	07:00 PM	0.0	20.8	8.1	44	21	250	31	1016.7
09/02/2014	07:30 PM	0.0	19.9	7.6	45	21	240	31	1017.3
09/02/2014	08:00 PM	0.0	19.1	7.2	46	15	240	24	1018.0
09/02/2014	08:30 PM	0.0	18.1	7.8	51	13	250	24	1018.7
09/02/2014	09:00 PM	0.0	17.3	6.2	48	11	250	21	1019.4
09/02/2014	09:30 PM	0.0	16.3	6.4	52	8	250	13	1020.0
09/02/2014	10:00 PM	0.0	14.9	6.7	58	4	280	8	1020.6
09/02/2014	10:30 PM	0.0	14.1	7.4	64	4	300	5	1020.6
09/02/2014	11:00 PM	0.0	13.5	7.7	68	4	290	8	1020.7
09/02/2014	11:30 PM	0.0	13.5	7.5	67	4	320	8	1020.5
10/02/2014	12:00 AM	0.0	13.4	7.6	68	5	310	8	1020.4

P.W.





**Australian Government**  
**Bureau of Meteorology**

**Certified Extract No. E62D394A91-1**

**Fire Weather Warnings issued for Victoria 3 to 9 February 2014**

IDV22000  
Australian Government Bureau of Meteorology  
Victoria

**Fire Weather Warning**  
for the Mallee, Northern Country and North Central forecast districts.

Issued at 5:04 am EDT on Monday 3 February 2014.

**Weather Situation**

A low pressure trough will sweep across across Victoria today with a milder southerly air stream to follow.

For the rest of Monday 3 February:

Severe Fire Danger is forecast for the following forecast districts:  
Mallee, Northern Country and North Central

The CFA advises that you

- Monitor the weather at [www.bom.gov.au](http://www.bom.gov.au) and the fire situation at [www.cfa.vic.gov.au](http://www.cfa.vic.gov.au), or through your emergency broadcasters: ABC and commercial radio stations and SKY News TV.
- Call '000' if you see flames.
- Check your bushfire survival plan now.
- For more information on fire danger ratings and actions refer to [www.cfa.vic.gov.au](http://www.cfa.vic.gov.au).
- Prepare. Act. Survive.

No further warnings will be issued for this event, but the situation will continue to be monitored and further warnings issued if necessary.

*P.W.*



**Australian Government**  
**Bureau of Meteorology**

IDV22000  
Australian Government Bureau of Meteorology  
Victoria

**Fire Weather Warning**  
for the North Central and South West forecast districts.

Issued at 4:04 pm EDT on Friday 7 February 2014.

**Weather Situation**

A hot to very hot and mostly sunny day with light to moderate north to northwesterly winds and afternoon coastal seabreezes. Winds shifting milder southwesterly in the west at night.

For Saturday 8 February:

Severe Fire Danger is forecast for the following forecast districts:  
North Central and South West

The CFA advises that you

- Monitor the weather at [www.bom.gov.au](http://www.bom.gov.au) and the fire situation at [www.cfa.vic.gov.au](http://www.cfa.vic.gov.au), or through your emergency broadcasters: ABC and commercial radio stations and SKY News TV.
- Call '000' if you see flames.
- Check your bushfire survival plan now.
- For more information on fire danger ratings and actions refer to [www.cfa.vic.gov.au](http://www.cfa.vic.gov.au).
- Prepare. Act. Survive.

The next warning will be issued by 5:00 am EDT Saturday.

P.W.



**Australian Government**  
**Bureau of Meteorology**

IDV22000  
Australian Government Bureau of Meteorology  
Victoria

**Fire Weather Warning**  
for the Wimmera, North Central, South West and Central forecast districts.

Issued at 5:08 am EDT on Saturday 8 February 2014.

**Weather Situation**

A high pressure system over the Tasman Sea will direct a northerly airflow across Victoria today. A low pressure trough over the Bight will link to a low pressure system further south before entering southwestern Victoria tonight. The trough will move rapidly eastwards across the State on Sunday, bringing with it a cooler, fresh to strong and gusty southwesterly change, expected through central districts during the morning and clearing eastern districts by late afternoon.

For the rest of Saturday 8 February:

Severe Fire Danger is forecast for the following forecast districts:  
Wimmera, North Central, South West and Central

The CFA advises that you

- Monitor the weather at [www.bom.gov.au](http://www.bom.gov.au) and the fire situation at [www.cfa.vic.gov.au](http://www.cfa.vic.gov.au), or through your emergency broadcasters: ABC and commercial radio stations and SKY News TV.
- Call '000' if you see flames.
- Check your bushfire survival plan now.
- For more information on fire danger ratings and actions refer to [www.cfa.vic.gov.au](http://www.cfa.vic.gov.au).
- Prepare. Act. Survive.

No further warnings will be issued for this event, but the situation will continue to be monitored and further warnings issued if necessary.

P.W.



**Australian Government**  
**Bureau of Meteorology**

IDV22000  
Australian Government Bureau of Meteorology  
Victoria

**Fire Weather Warning**

for the Mallee, Wimmera, Northern Country, North Central, North East, South West, Central, West and South Gippsland and East Gippsland forecast districts.

Issued at 4:47 pm EDT on Saturday 8 February 2014.

**Weather Situation**

Hot to very hot and dry conditions are forecast for the remainder of today. Hot to very hot again tomorrow with fresh to locally strong north to northwesterly winds ahead of a trough which will move rapidly across the State bringing with it a cooler, fresh to strong and gusty southwesterly change. The change is expected through central districts during the morning, reaching eastern districts later in the afternoon.

For the rest of Saturday 8 February:

Severe Fire Danger in the following forecast districts:

Wimmera, North Central, South West and Central

For Sunday 9 February:

Extreme Fire Danger is forecast for the following forecast districts:

Northern Country, North Central, North East, Central, West and South Gippsland and East Gippsland

Severe Fire Danger is forecast for the following forecast districts:

Mallee and Wimmera

The CFA advises that you

- Monitor the weather at [www.bom.gov.au](http://www.bom.gov.au) and the fire situation at [www.cfa.vic.gov.au](http://www.cfa.vic.gov.au), or through your emergency broadcasters: ABC and commercial radio stations and SKY News TV.
- Call '000' if you see flames.
- Check your bushfire survival plan now.
- For more information on fire danger ratings and actions refer to [www.cfa.vic.gov.au](http://www.cfa.vic.gov.au).
- Prepare. Act. Survive.

The next warning will be issued by 5:00 am EDT Sunday.

P.W.



**Australian Government**  
**Bureau of Meteorology**

IDV22000  
Australian Government Bureau of Meteorology  
Victoria

**Fire Weather Warning**  
for the Mallee, Wimmera, Northern Country, North Central, North East, Central,  
West and South Gippsland and East Gippsland forecast districts.

Issued at 4:01 am EDT on Sunday 9 February 2014.

**Weather Situation**

Hot to very hot conditions with fresh to locally strong north to northwesterly winds ahead of a cold front rapidly crossing the State today and bringing with it a cooler, fresh to strong and gusty southwesterly change. The change is expected through central districts around midday, reaching eastern districts later in the afternoon.

For the rest of Sunday 9 February:

Extreme Fire Danger is forecast for the following forecast districts:  
Northern Country, North Central, North East, Central, West and South Gippsland  
and East Gippsland

Severe Fire Danger is forecast for the following forecast districts:  
Mallee and Wimmera

The CFA advises that you

- Monitor the weather at [www.bom.gov.au](http://www.bom.gov.au) and the fire situation at [www.cfa.vic.gov.au](http://www.cfa.vic.gov.au), or through your emergency broadcasters: ABC and commercial radio stations and SKY News TV.
- Call '000' if you see flames.
- Check your bushfire survival plan now.
- For more information on fire danger ratings and actions refer to [www.cfa.vic.gov.au](http://www.cfa.vic.gov.au).
- Prepare. Act. Survive.

No further warnings will be issued for this event, but the situation will continue to be monitored and further warnings issued if necessary.

*P.w.*



Appendix A: Location of sites provided

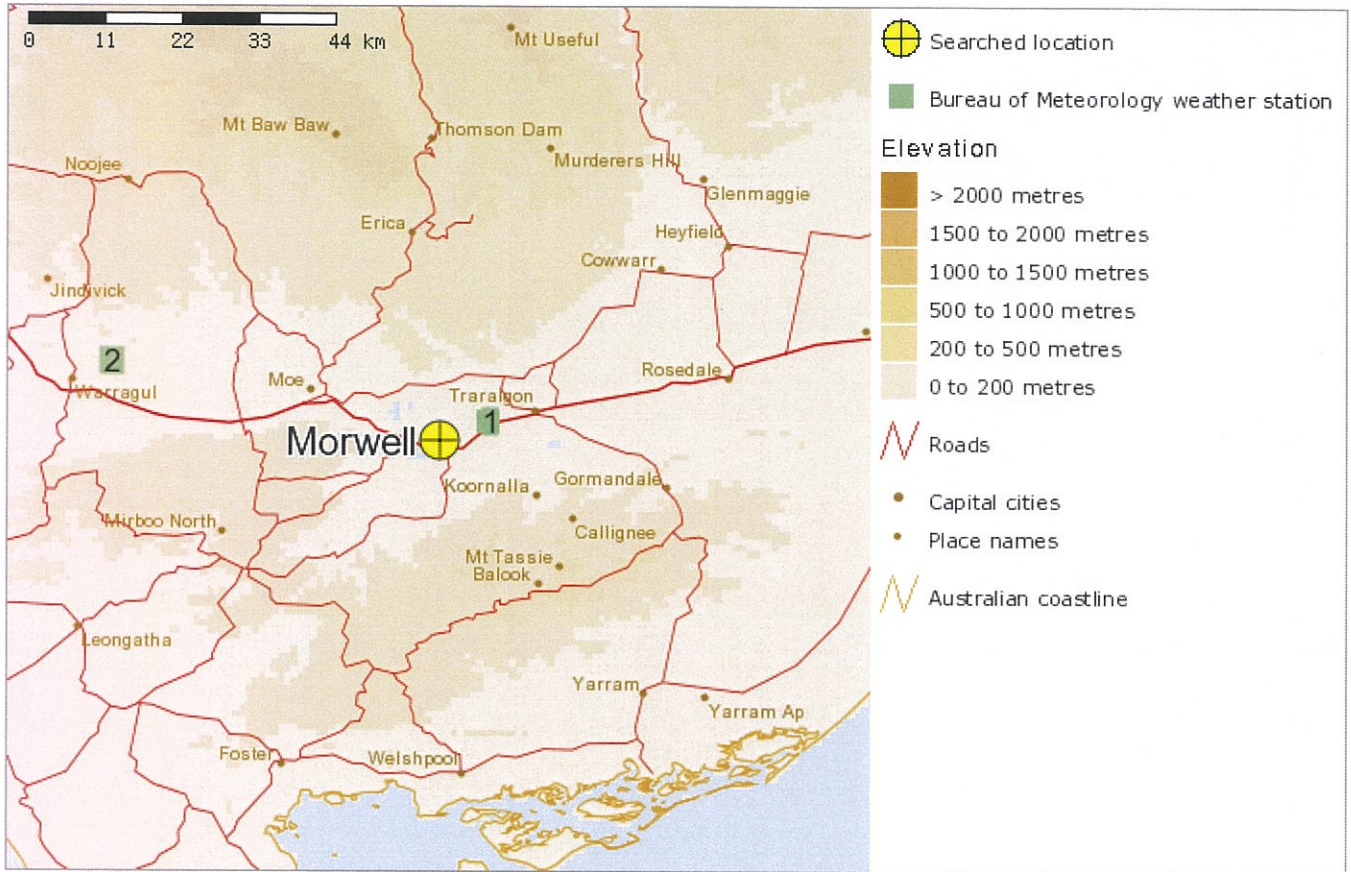


Figure 1: Map of Bureau of Meteorology weather stations in the Morwell area included in Certified Extract No. E62D394A91-1

Label	Site Name	Site No.	Distance (km)	Elevation (m)	Latitude	Longitude
1	Morwell (Lalor Airport)	085280	6.3	55.7	-38.2094	146.4747
2	Nilma North (Warragul)	085313	38.8	134.1	-38.1322	145.9867

Table 1: Station details of Bureau of Meteorology weather stations in the Morwell area included in Certified Extract No. E62D394A91-1



## **Appendix B: Observation and Warning Notes**

The following notes are provided to assist with your interpretation of the supplied weather observations.

### **GENERAL INFORMATION**

#### **DATE AND TIME**

Observation Date and Time are expressed in Local Clock Time (LCT). LCT is the 'clock time' and is normally the same as Local Standard Time, but reflects Daylight Saving where applicable. For further information on the various time-zones used across Australia, please refer to:

<http://www.bom.gov.au/climate/averages/tables/daysavtm.shtml>.

Date format is in dd/mm/yyyy, whilst Time format is hh:mm AM/PM.

#### **GAPS AND MISSING DATA**

Very few sites have a complete unbroken record of climate information. A site may have been closed, reopened, upgraded to a full weather site or downgraded to a rainfall only site during its existence causing breaks in the record for some or all elements. Some gaps may be for one element due to a damaged instrument, others may be for all elements due to the absence or illness of an observer. Some elements are only recorded when an observer is present. When suspect data have been identified through the quality control process, these data have been excluded.

Where there are gaps in the data tables provided, that means that no data is available.

#### **QUALITY CONTROL (QC)**

Recent data may not have been fully quality controlled, indicated by an "N" in the QC columns. This means the data is 'as read'. This does not mean that the data is incorrect, merely that the full quality control process has not been completed.

In tables where "QC" columns are included, the QC value is relating to the observed value in the column immediately to its left.

#### **GENERAL NOTES ON OBSERVATIONS**

**Temperature:** Temperature (including air temperature, dewpoint temperature and wet bulb temperature) is recorded in a Stevenson Screen, which allows for good air flow across the thermometers, and prevents heating from direct sunlight. The height of the thermometers is approximately 1.2 m above the ground. For more information please refer to: <http://www.bom.gov.au/climate/cdo/about/airtemp-measure.shtml>.

**Rainfall:** Rainfall is measured either manually using a 203 mm rain gauge, or automatically using a "Tipping Bucket Rain Gauge". Rainfall includes all forms of water particles, whether liquid (for example, rain or drizzle) or solid (hail or snow), that fall from clouds and reaches the ground at the point of observation. For more information please refer to: <http://www.bom.gov.au/climate/how/observations/rain-measure.shtml>

**Wind:** Wind is generally measured using an anemometer and at a height of approximately 10 metres above the surface. However, at some sites, typically those without an Automatic Weather Station (AWS), wind may be estimated visually using the Beaufort Wind Scale.



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Relative humidity: Relative humidity (RH) is obtained either from measurements by an electronic relative humidity sensor or derived via complex equations from wet and dry bulb temperature observations. There can be slight differences between RH values measured directly by a relative humidity sensor and those derived using equations. Typically these differences are less than 1%. The uncertainty associated with RH data increases at the extremes. That is, in very dry air as RH approaches 0%, and in very humid conditions as RH approaches 100%. There are some occasions when reported RH values may slightly exceed 100%. In these instances you should consider the value to be 100%.

Most of the Bureau of Meteorology's Automatic Weather Stations report observations of air temperature, dew-point temperature, relative humidity and pressure as instantaneous values (1-second samples). A small proportion of our Automatic Weather Stations report a 1-minute average for air temperature, dewpoint temperature, relative humidity and pressure. The difference, if any, between these reporting periods is insignificant.





## DATA TABLE NOTES

### Notes for Automatic Weather Observation Table:

1. Automatic Weather Stations (AWSs) provide observations of meteorological conditions, generally reporting at half-hourly or hourly intervals.
2. All Bureau of Meteorology AWS equipment is designed and maintained to Bureau of Meteorology standards. Apart from routine inspections, no further quality control of half-hourly or hourly AWS observations is undertaken.
3. Bureau of Meteorology AWSs are unable to make audio or visual observations, so they do not report the occurrence of thunderstorms, fog, or other weather phenomena.
4. Rain since 9am is expressed in millimetres (mm), and is the cumulative precipitation recorded since 9am local time. The rainfall total is reset to zero daily at 9am local time.
5. Air Temperature is expressed in degrees Celsius (°C).
6. Dewpoint Temperature is a calculated value (based on readings of air temperature and wet-bulb temperature). The dewpoint is the temperature to which the air must be cooled, without change in pressure and water vapour content, in order for condensation of water vapour to occur. It therefore directly indicates the moisture content of the air; a low value indicates dry air. The closer the dewpoint is to the air temperature, the more moist the air and the higher the relative humidity.
7. Relative Humidity is expressed as a percentage (%) and is calculated using the air temperature reading and the calculated dewpoint. It is another indicator of the moisture content of the air. It is the ratio of the amount of moisture actually in the air to the maximum amount of moisture which the air could hold at the same temperature. At saturation the relative humidity will be close to 100%.
8. Wind Speed is expressed in kilometres per hour (km/h) and is the average wind speed, usually observed over the 10 minutes prior to the observation time. When a significant wind change occurs during the 10 minute period prior to an observation, additional special observations may be reported by the AWS. Wind is generally measured at a height of 10 m above the surface. Calm conditions are expressed as 0 in both wind direction and wind speed. Refer to "Appendix C - Beaufort Wind Scale" for wind speed categories.
9. Wind Direction is expressed in degrees (true) and is the mean wind direction averaged over the same period as the wind speed, typically during the ten minute period up until the observation time. It is measured clockwise from True North, rounded to the nearest 10 degrees, and indicates the direction from which the wind is blowing. For example 090 is equivalent to a wind coming directly from the east.
10. Wind Gust is expressed in kilometres per hour (km/h) and refers to the maximum 3-second wind speed recorded in the 10-minute period prior to the indicated time. When the wind direction and wind speed are both zero, wind gust is also assumed to be zero.
11. Mean Sea Level Pressure (MSLP) is expressed in hectopascals (hPa) and is the atmospheric pressure converted to an equivalent pressure at sea level. The use of MSLP allows for comparison of sites at different elevations.



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## **FORECAST AND WARNINGS NOTES**

### **Forecast services for General Public purposes**

The Bureau of Meteorology continually monitors the weather patterns across Australia on behalf of the Australian community. Generally forecasts are issued in the early morning and late afternoon to meet media broadcast requirements. Forecasts may be updated at any time if the short term weather patterns are expected to change rapidly.

### **Weather Words**

Weather forecasts and warnings have to compress a lot of information into standardised, brief messages. Forecast and warning weather terms represent the more detailed definitions provided on our “Weather Words” webpage. Please refer to: <http://www.bom.gov.au/info/wwords/>.

Forecasts and warnings have to accommodate variations across the time range, and often large areas, that they apply to. It is important to understand the use of duration and distribution terms, especially for elements like showers and thunderstorms, when considering the impact for a specific location or time.

### **Fire Weather Warnings**

The Bureau of Meteorology issue Fire Weather Warnings when weather conditions are conducive to the spread of dangerous bushfires. Warnings are generally issued within 24 hours of the potential onset of hazardous conditions.

Fire agencies determine Fire Danger Ratings. In most States and Territories, fire agencies declare fire bans based on a range of criteria including forecast weather provided by the Bureau.

The information contained in Fire Weather Warnings includes:

- The office which issued the warning
- The local time, day and date that it was issued
- A description of the relevant meteorological conditions and Fire Danger Rating
- The area where weather conditions are conducive to the spread of dangerous fires
- The time period for which it will be in effect

The Bureau also incorporates Total Fire Ban Advices into warnings if one is being enforced at the time of issue and an action statement from local fire authorities detailing areas where the ban is in effect.

Fire Weather Warnings are distributed through the media, fire agencies and other key emergency service organisations. Warnings are normally issued in the afternoon for the following day so to be available for evening television and radio news broadcasts. Warnings are renewed at regular intervals and generally at the same time major forecasts are issued. However, warnings may be issued or amended and reissued at any time if a need is identified. If there is a Fire Weather Warning current, the Bureau will mention this in State, Territory and District weather forecasts for that area.

In each State the issue of a Fire Weather Warning has different impacts on restrictions for lighting fires.



**Appendix C: Beaufort Wind Scale**

**Please note:** Beaufort scale numbers and descriptive terms such as 'near gale', 'strong gale' and 'violent storm' are not normally used in Bureau of Meteorology communications or forecasts.

Beaufort Scale No.	Descriptive Term	Units in km/h	Units in knots*	Description on Land	Description at Sea
0	Calm	0	0	Smoke rises vertically	Sea like a mirror.
1-3	Light winds	19 km/h or less	10 knots or less	Wind felt on face; leaves rustle; ordinary vanes moved by wind.	Small wavelets, ripples formed but do not break; A glassy appearance maintained.
4	Moderate winds	20 - 29 km/h	11-16 knots	Raises dust and loose paper; small branches are moved.	Small waves - becoming longer; fairly frequent white horses.
5	Fresh winds	30 - 39 km/h	17-21 knots	Small trees in leaf begin to sway; crested wavelets form on inland waters	Moderate waves, taking a more pronounced long form; many white horses are formed - a chance of some spray
6	Strong winds	40 - 50 km/h	22-27 knots	Large branches in motion; whistling heard in telephone wires; umbrellas used with difficulty.	Large waves begin to form; the white foam crests are more extensive with probably some spray
7	Near gale	51 - 62 km/h	28-33 knots	Whole trees in motion; inconvenience felt when walking against wind.	Sea heaps up and white foam from breaking waves begins to be blown in streaks along direction of wind.
8	Gale	63 - 75 km/h	34-40 knots	Twigs break off trees; progress generally impeded.	Moderately high waves of greater length; edges of crests begin to break into spindrift; foam is blown in well-marked streaks along the direction of the wind.
9	Strong gale	76 - 87 km/h	41-47 knots	Slight structural damage occurs -roofing dislodged; larger branches break off.	High waves; dense streaks of foam; crests of waves begin to topple, tumble and roll over; spray may affect visibility.
10	Storm	88 - 102 km/h	48-55 knots	Seldom experienced inland; trees uprooted; considerable structural damage.	Very high waves with long overhanging crests; the resulting foam in great patches is blown in dense white streaks; the surface of the sea takes on a white appearance; the tumbling of the sea becomes heavy with visibility affected.
11	Violent storm	103 -117 km/h	56-63 knots	Very rarely experienced - widespread damage	Exceptionally high waves; small and medium sized ships occasionally lost from view behind waves; the sea is completely covered with long white patches of foam; the edges of wave crests are blown into froth.
12+	Hurricane	118 km/h or more	64 knots or more	Very rarely experienced - widespread damage	The air is filled with foam and spray. Sea completely white with driving spray; visibility very seriously affected

\*Conversions of knots to kilometres per hour are not exact because of established conventions.