Appendix A:

Dust Monitoring Data

Austar Coal Mine 2013-2014 Dust Deposition Gauge Results (g/m^2/month)

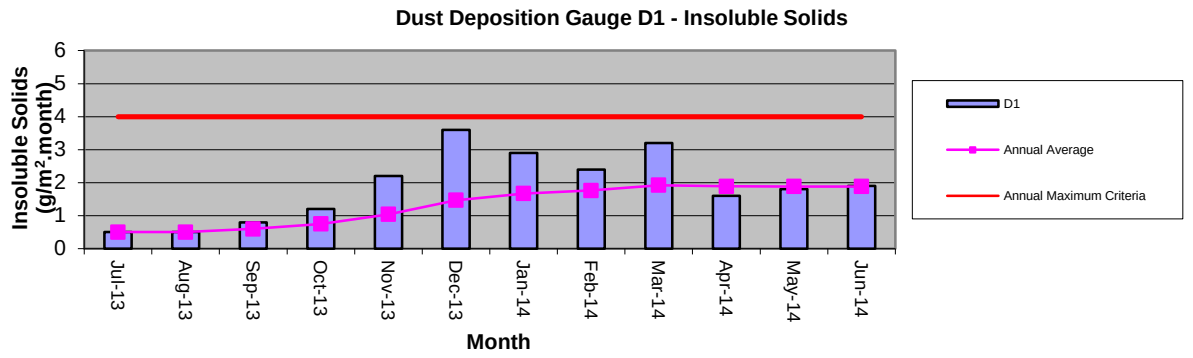
Month	D1			D2			D2A			D3			D4			
	Insoluble Matter	Annual Average YTD	Ash	Insoluble Matter	Annual Average YTD	Ash	Insoluble Matter	Annual Average YTD	Ash	Insoluble Matter	Annual Average YTD	Ash	Insoluble Matter	Annual Average YTD	Ash	Annual Maximum Criteria
Jul-13	0.5	0.5	0.3	1.2	1.2	0.9	NS	NS	NS	0.3	0.3	0.3	0.7	0.7	0.5	4.0
Aug-13	0.5	0.5	0.3	1.1	1.2	0.9	0.4	0.4	0.2	0.4	0.4	0.2	0.3	0.5	0.2	4.0
Sep-13	0.8	0.6	0.4	2	1.4	1.5	0.3	0.4	0.1	0.4	0.4	0.3	2.7	1.2	2	4.0
Oct-13	1.2	0.8	0.7	1.2	1.4	0.7	0.6	0.4	0.3	0.7	0.5	0.6	0.8	1.1	0.4	4.0
Nov-13	2.2	1.0	1.2	2.6	1.6	1.4	1.6	0.7	1	0.6	0.5	0.3	1.7	1.2	1	4.0
Dec-13	3.6	1.5	1.2	2.6	1.8	0.5	3.9	1.4	1.1	3.9	1.1	0.8	2.5	1.5	0.7	4.0
Jan-14	2.9	1.7	1.5	3.2	2.0	0.8	0.8	1.3	0.2	2.1	1.2	1	5c	1.5	0.7	4.0
Feb-14	2.4	1.8	1.1	2.1	2.0	1	4.9	1.8	4.1	1.2	1.2	0.7	1.2	1.4	1	4.0
Mar-14	3.2	1.9	2.1	2.3	2.0	1.4	NS	NS	NS	1	1.2	0.7	2.4	1.5	1.6	4.0
Apr-14	1.6	1.9	1.2	2.1	2.0	1.3	NS	NS	NS	1.8	1.2	1.2	1.8	1.6	1.3	4.0
May-14	1.8	1.9	1.1	0.9	1.9	0.6	NS	NS	NS	0.6	1.2	0.3	3.6	1.8	2.8	4.0
Jun-14	1.9	1.9	1.3	0.7	1.8	0.5	NS	NS	NS	0.2	1.1	0.1	2.3	1.8	2	4.0

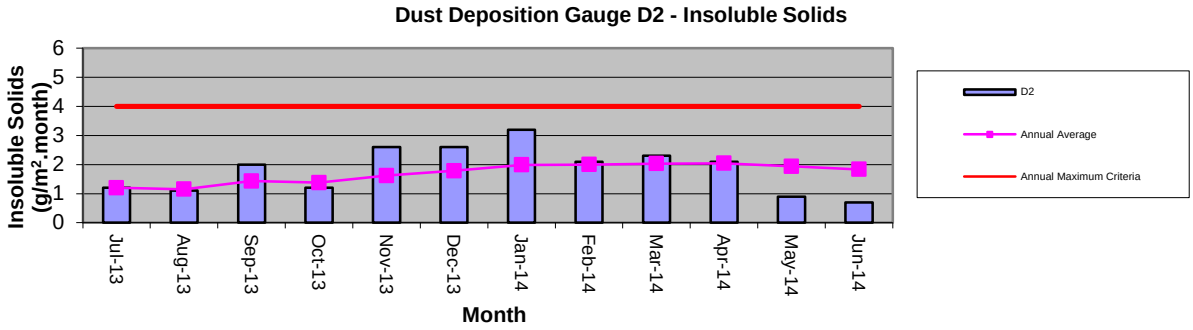
Austar Coal Mine 2013-2014 Dust Deposition Gauge Results (g/m^2/month) (cont.)

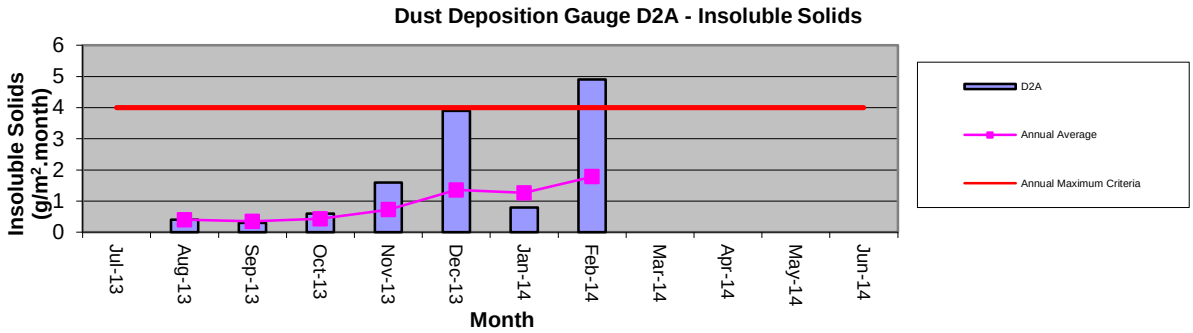
Month	D5			D7			D8			D9			
	Insoluble Matter	Annual Average YTD	Ash	Insoluble Matter	Annual Average YTD	Ash	Insoluble Matter	Annual Average YTD	Ash	Insoluble Matter	Annual Average YTD	Ash	Annual Maximum Criteria
Jul-13	1	1.0	0.7	0.4	0.4	0.3	0.3	0.3	0.2	0.1	0.1	0.1	4.0
Aug-13	0.3	0.7	0.2	0.2	0.3	0.1	0.2	0.3	0.1	0.2	0.2	0.2	4.0
Sep-13	0.7	0.7	0.5	0.4	0.3	0.2	0.4	0.3	0.2	0.5	0.3	0.3	4.0
Oct-13	1	0.8	0.6	0.6	0.4	0.4	0.5	0.4	0.3	0.3	0.3	0.2	4.0
Nov-13	0.9	0.8	0.5	1.8	0.7	1.1	3.8c	0.4	1	1.2	0.5	0.7	4.0
Dec-13	2.1	1.0	0.8	1	0.7	0.4	0.6	0.4	0.2	0.9	0.5	0.4	4.0
Jan-14	7.4c	1.0	0.7	0.9	0.8	0.4	1.8	0.6	0.9	2.5	0.8	0.7	4.0
Feb-14	7.6c	1.0	1.6	0.5	0.7	0.2	0.3	0.6	0.1	0.9	0.8	0.5	4.0
Mar-14	**5.2**	1.6	3.5	1.2	0.8	0.6	1	0.6	0.5	1.4	0.9	0.8	4.0
Apr-14	1.4	1.6	1	0.5	0.8	0.3	0.6	0.6	0.3	0.5	0.9	0.3	4.0
May-14	5.9c	1.6	4.8	0.5	0.7	0.3	0.5	0.6	0.2	0.3	0.8	0.2	4.0
Jun-14	1.2	1.5	1	0.3	0.7	0.2	0.5	0.6	0.3	0.7	0.8	0.5	4.0

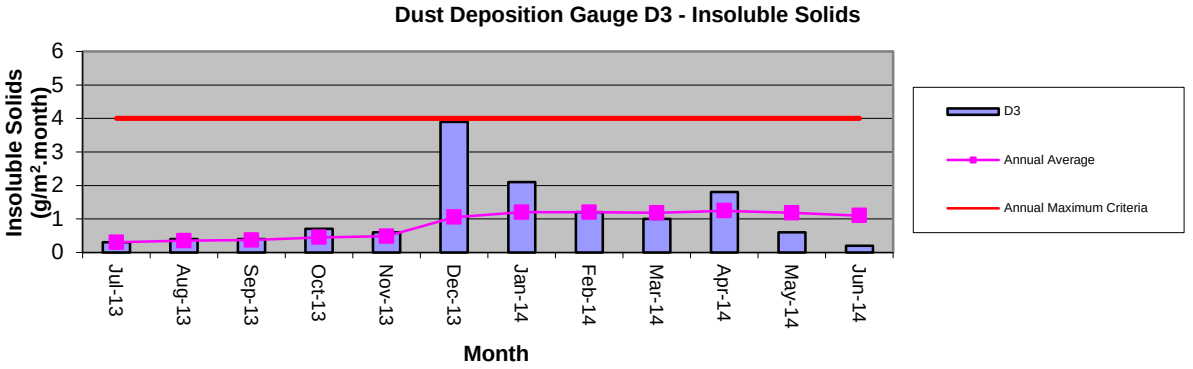
Note: *"c" denotes contaminated with bird droppings or similar. NS denotes sampling not undertaken. NA denotes sample not available as bottle was missing. Not used for Annual Average Calculations.*
Individual monthly dust results and Annual Average dust results over the Annual Average Criteria of 4g/m^2 are highlighted in bold.
YTD denotes Year to Date.

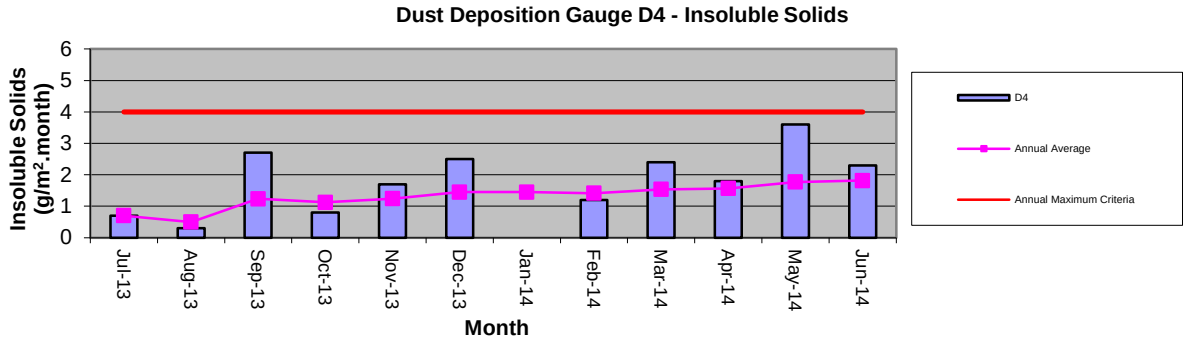
Austar Coal Mine 2013-2014 Dust Deposition Gauge Result Graphs

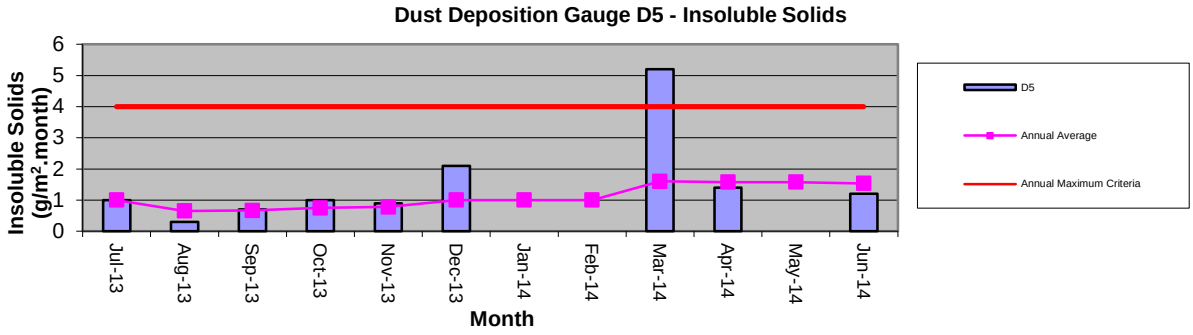


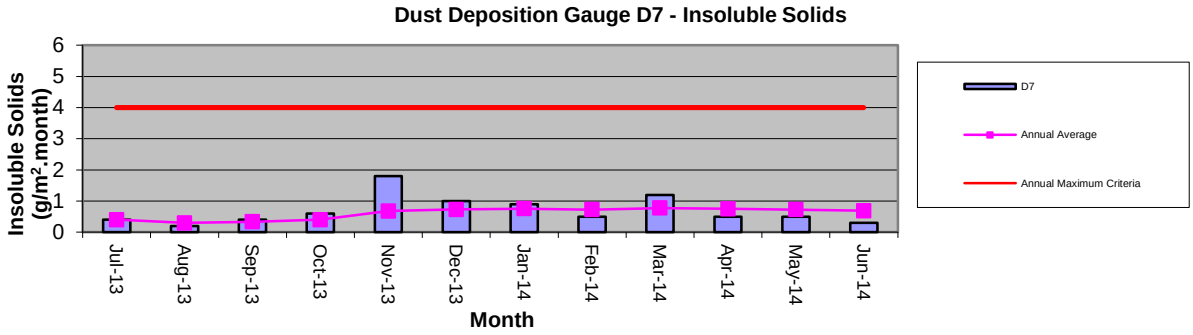


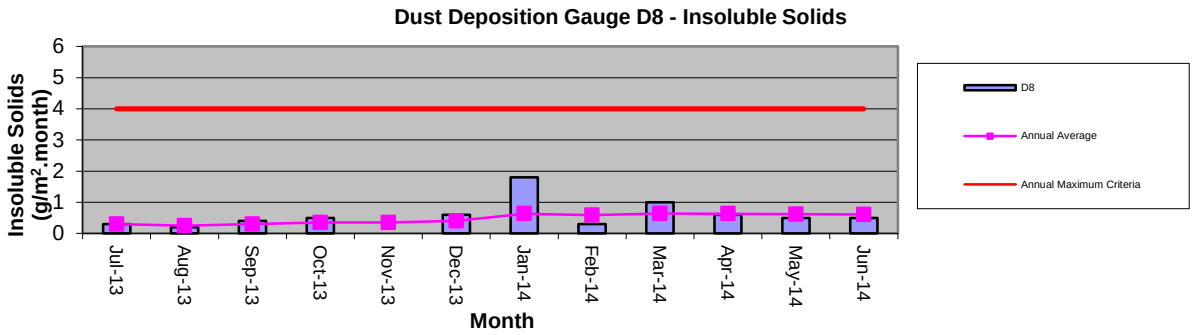


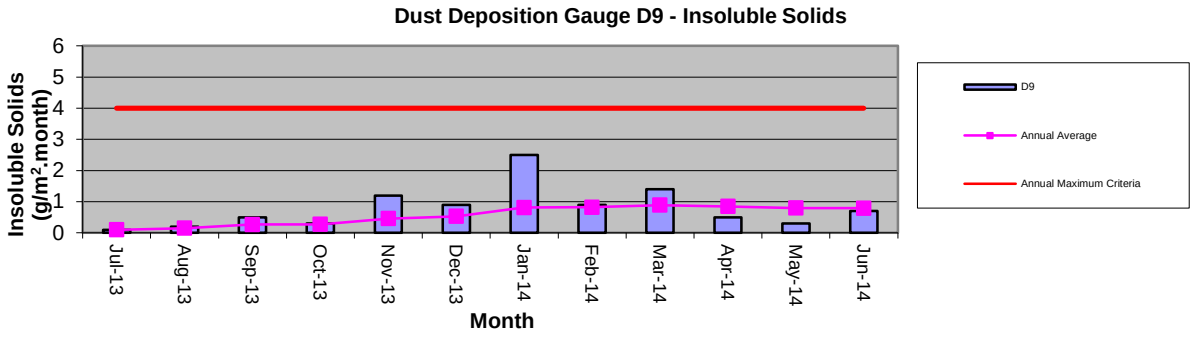



Dust Deposition Gauge D4 - Insoluble Solids
Insoluble Solids (g/m².month)
0
1
2
3
4
5
6
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Month
D4
Annual Average
Annual Maximum Criteria


Dust Deposition Gauge D5 - Insoluble Solids
Insoluble Solids (g/m².month)
0
1
2
3
4
5
6
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Month
D5
Annual Average
Annual Maximum Criteria


Dust Deposition Gauge D7 - Insoluble Solids
Insoluble Solids (g/m².month)
0
1
2
3
4
5
6
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Month
D7
Annual Average
Annual Maximum Criteria


Dust Deposition Gauge D8 - Insoluble Solids
Insoluble Solids (g/m².month)
0
1
2
3
4
5
6
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Month
D8
Annual Average
Annual Maximum Criteria



Note: Where dust gauge was contaminated (e.g. bird droppings), data is not presented.

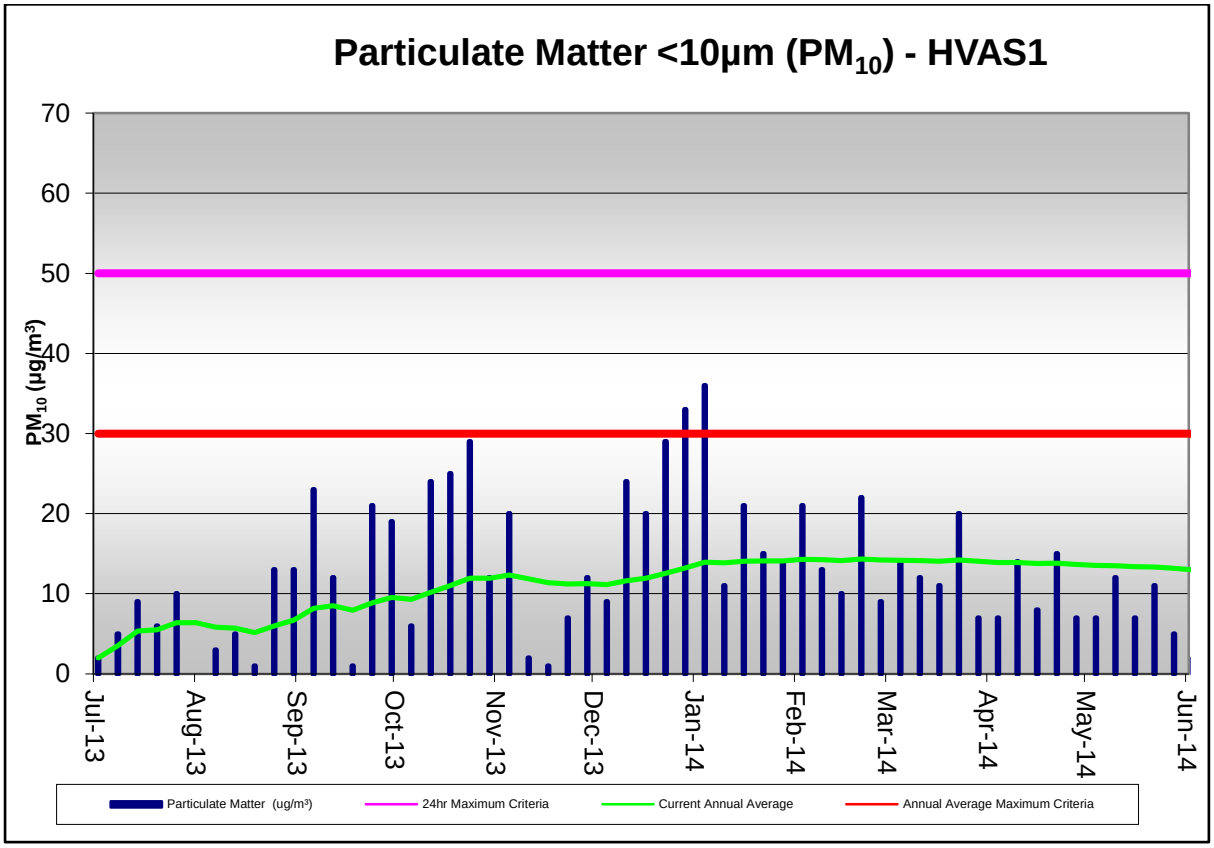
Austar Coal Mine 2013-2014 High Volume Air Sampler (HVAS) Results (PM_{10} µg/m^3)

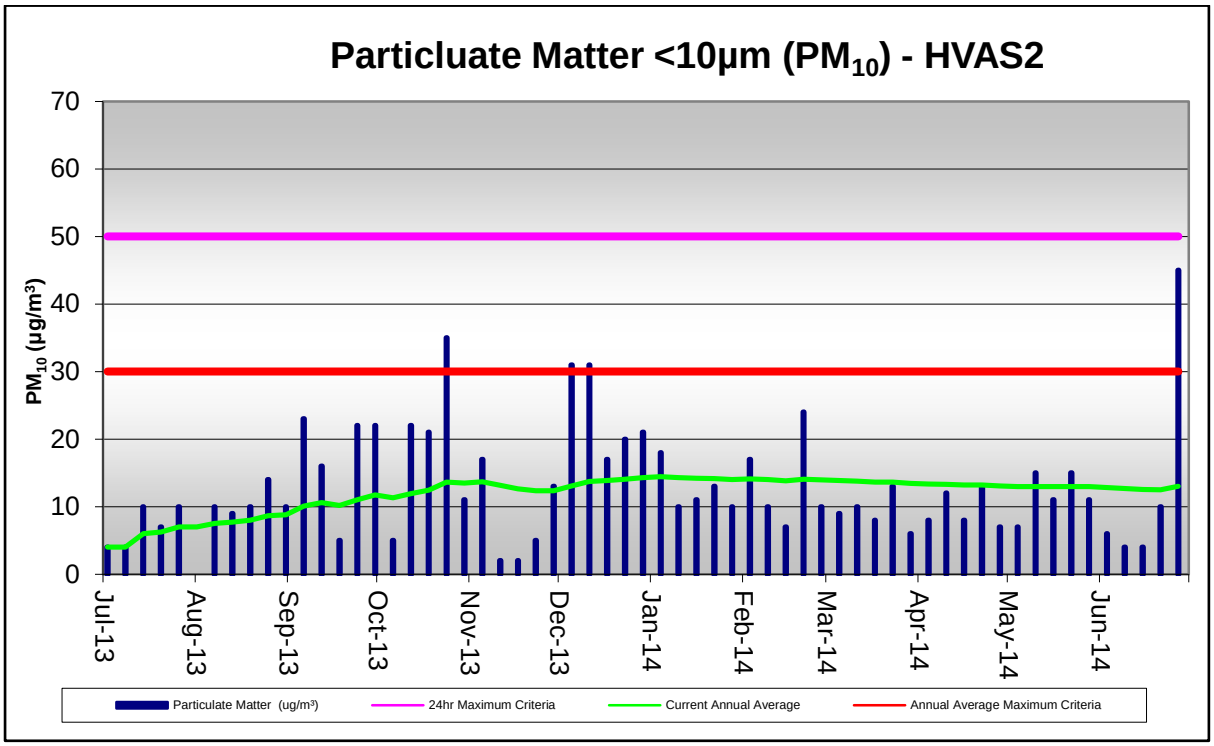
Date	Particulate Matter <10µm (PM_{10}) – HVAS1			Particulate Matter <10µm (PM_{10}) – HVAS2			Particulate Matter <10µm (PM_{10}) – HVAS3		
	Particulate Matter	Monthly Average	Current Annual Average YTD	Particulate Matter	Monthly Average	Current Annual Average YTD	Particulate Matter	Monthly Average	Current Annual Average YTD
2/07/2013	2	-	2.0	4	-	4.0	-	-	-
8/07/2013	5	-	3.5	4	-	4.0	-	-	-
14/07/2013	9	-	5.3	10	-	6.0	-	-	-
20/07/2013	6	-	5.5	7	-	6.3	-	-	-
26/07/2013	10	6.4	6.4	10	7.0	7.0	-	-	-
1/08/2013	<1	-	6.4	<1	-	7.0	-	-	-
7/08/2013	3	-	5.8	10	-	7.5	-	-	-
13/08/2013	5	-	5.7	9	-	7.7	-	-	-
19/08/2013	1	-	5.1	10	-	8.0	-	-	-
25/08/2013	13	-	6.0	14	-	8.7	-	-	-
31/08/2013	13	7.0	6.7	10	10.6	8.8	-	-	-
6/09/2013	23	-	8.2	23	-	10.1	-	-	-
12/09/2013	12	-	8.5	16	-	10.6	-	-	-
18/09/2013	1	-	7.9	5	-	10.2	-	-	-
24/09/2013	21	-	8.9	22	-	11.0	-	-	-
30/09/2013	19	15.2	9.5	22	17.6	11.7	-	-	-
6/10/2013	6	-	9.3	5	-	11.3	-	-	-
12/10/2013	24	-	10.2	22	-	11.9	-	-	-
18/10/2013	25	-	11.0	21	-	12.4	-	-	-
24/10/2013	29	-	11.9	35	-	13.6	-	-	-
30/10/2013	12	19.2	12.0	11	18.8	13.5	-	-	-
5/11/2013	20	-	12.3	17	-	13.7	-	-	-
11/11/2013	2	-	11.9	2	-	13.1	-	-	-
17/11/2013	1	-	11.4	2	-	12.7	-	-	-
23/11/2013	7	-	11.2	5	-	12.3	-	-	-
29/11/2013	12	8.4	11.2	13	7.8	12.4	-	-	-
5/12/2013	9	-	11.2	31	-	13.1	-	-	-
11/12/2013	24	-	11.6	31	-	13.7	-	-	-
17/12/2013	20	-	11.9	17	-	13.9	-	-	-
23/12/2013	29	-	12.5	20	-	14.1	-	-	-
29/12/2013	33	23.0	13.2	21	24.0	14.3	-	-	-
4/01/2014	36	-	13.9	18	-	14.4	-	-	-
10/01/2014	11	-	13.8	10	-	14.3	-	-	-
16/01/2014	21	-	14.1	11	-	14.2	-	-	-
22/01/2014	15	-	14.1	13	-	14.1	-	-	-
28/01/2014	14	19.4	14.1	10	12.4	14.0	-	-	-
3/02/2014	21	-	14.3	17	-	14.1	-	-	-
9/02/2014	13	-	14.2	10	-	14.0	-	-	-
15/02/2014	10	-	14.1	7	-	13.8	-	-	-
21/02/2014	22	-	14.3	24	-	14.1	-	-	-
27/02/2014	9	15.0	14.2	10	13.6	14.0	-	-	-
5/03/2014	14	-	14.2	9	-	13.9	-	-	-

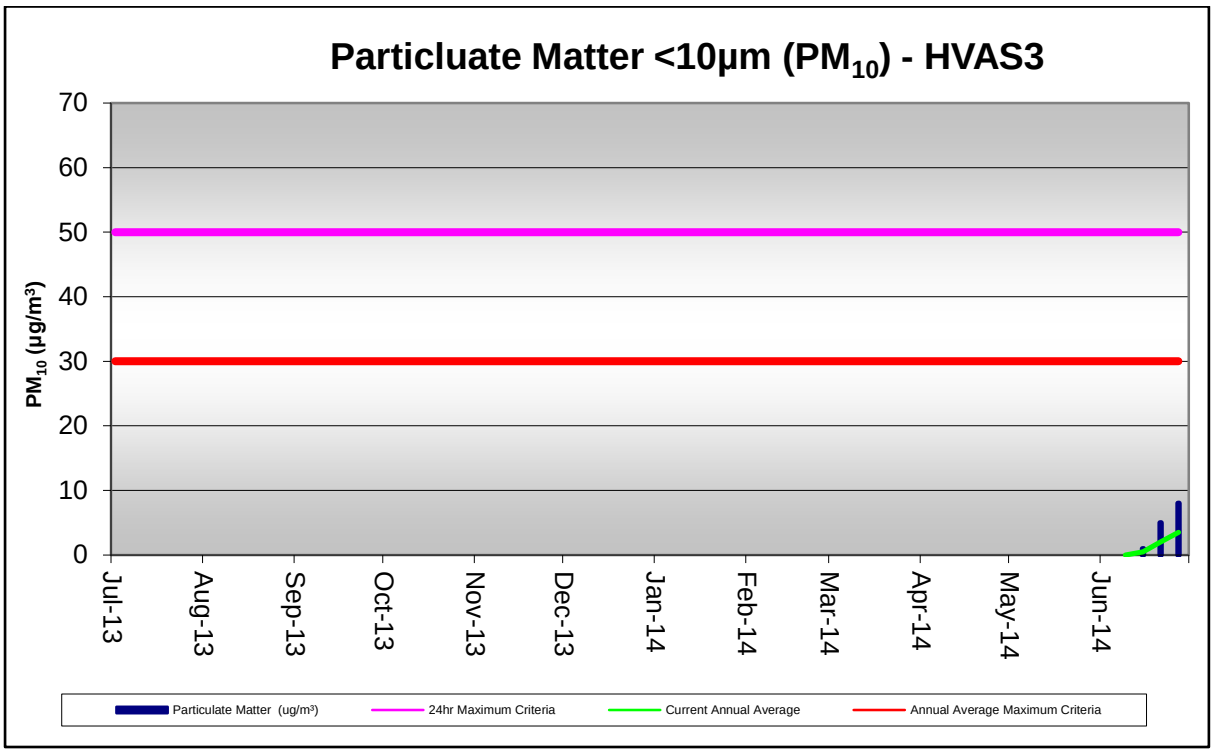
Date	Particulate Matter <10µm (PM_{10}) – HVAS1			Particulate Matter <10µm (PM_{10}) – HVAS2			Particulate Matter <10µm (PM_{10}) – HVAS3		
	Particulate Matter	Monthly Average	Current Annual Average YTD	Particulate Matter	Monthly Average	Current Annual Average YTD	Particulate Matter	Monthly Average	Current Annual Average YTD
11/03/2014	12	-	14.1	10	-	13.8	-	-	-
17/03/2014	11	-	14.1	8	-	13.6	-	-	-
23/03/2014	20	-	14.2	13	-	13.6	-	-	-
29/03/2014	7	12.8	14.0	6	9.2	13.4	-	-	-
4/04/2014	7	-	13.9	8	-	13.3	-	-	-
10/04/2014	14	-	13.9	12	-	13.3	-	-	-
16/04/2014	8	-	13.8	8	-	13.2	-	-	-
22/04/2014	15	-	13.8	13	-	13.2	-	-	-
28/04/2014	7	10.2	13.7	7	9.6	13.1	-	-	-
4/05/2014	7	-	13.5	7	-	12.9	-	-	-
10/05/2014	12	-	13.5	15	-	13.0	-	-	-
16/05/2014	7	-	13.4	11	-	12.9	-	-	-
22/05/2014	11	-	13.3	15	-	13.0	-	-	-
28/05/2014	5	8.4	13.2	11	11.8	12.9	-	-	-
3/06/2014	2	-	13.0	6	-	12.8	-	-	-
9/06/2014	3	-	12.8	4	-	12.7	0	-	0.0
15/06/2014	1	-	12.6	4	-	12.5	1	-	0.5
21/06/2014	5	-	12.5	10	-	12.5	5	-	2.0
27/06/2014	8	3.8	12.4	45	13.8	13.0	8	3.5	3.5

Note: *The annual average PM_{10} criterion is 30 µg/m^3. Annual average results greater than this figure are bold.*
The 24-hour average PM_{10} criterion is 50 µg/m^3. Results greater than this figure are bold.
YTD denotes year to date.

Austar Coal Mine 2013-2014 High Volume Air Sampler (HVAS) Results Graphs



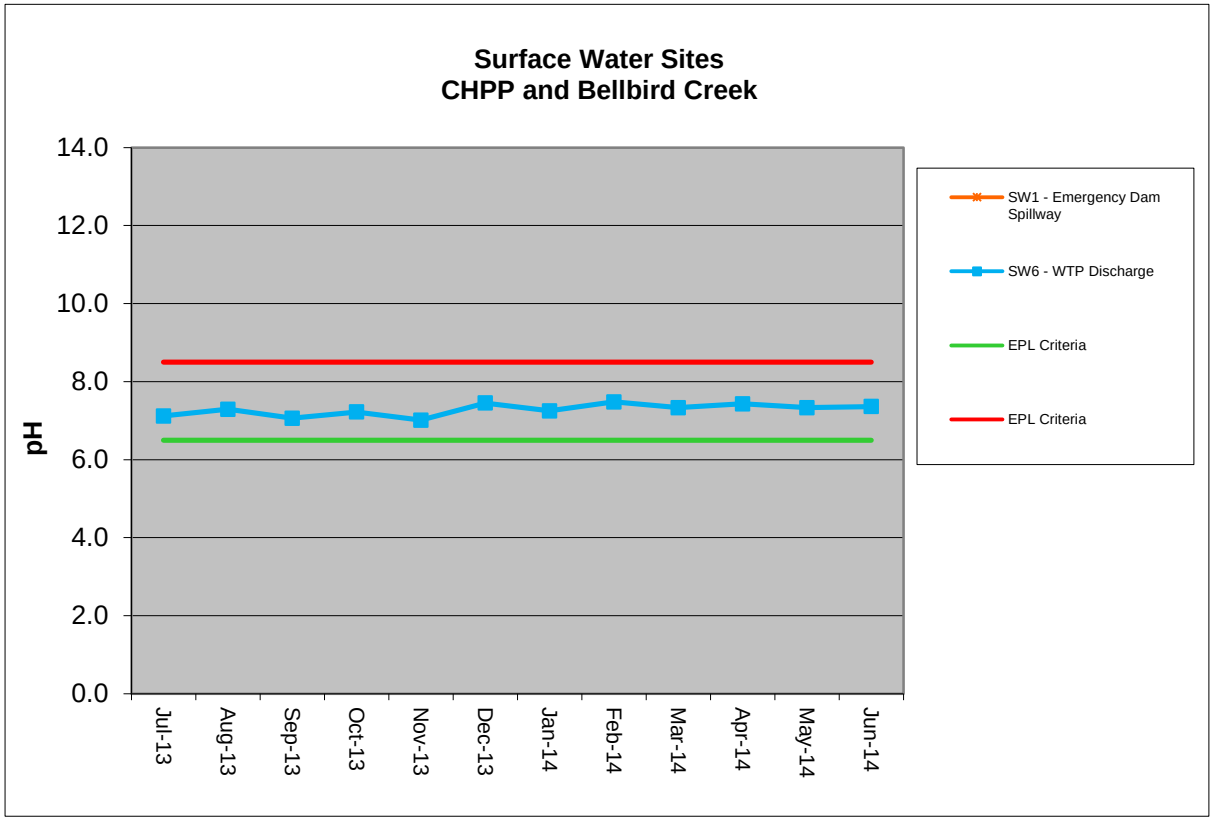


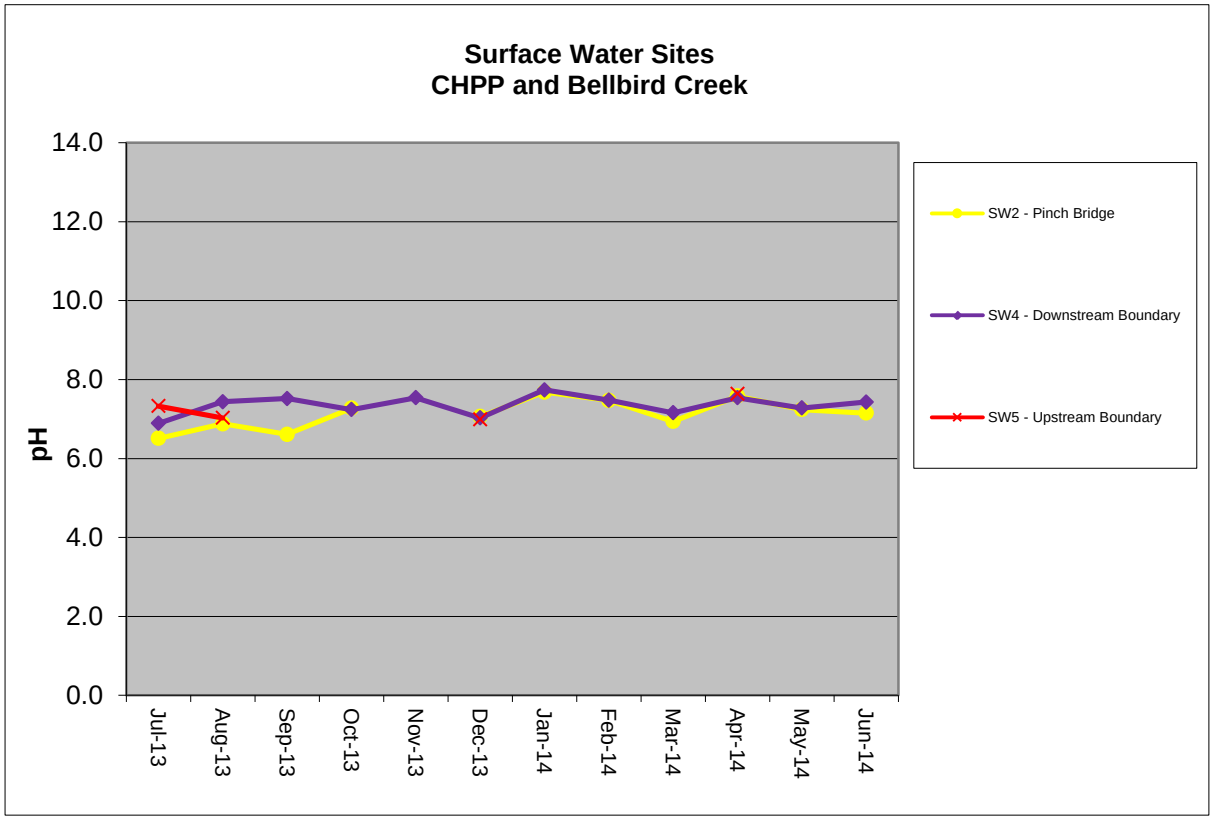

Particulate Matter <10µm (PM10) - HVAS3
PM10 (µg/m3)
70
60
50
40
30
20
10
0
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Particulate Matter (ug/m3)
24hr Maximum Criteria
Current Annual Average
Annual Average Maximum Criteria

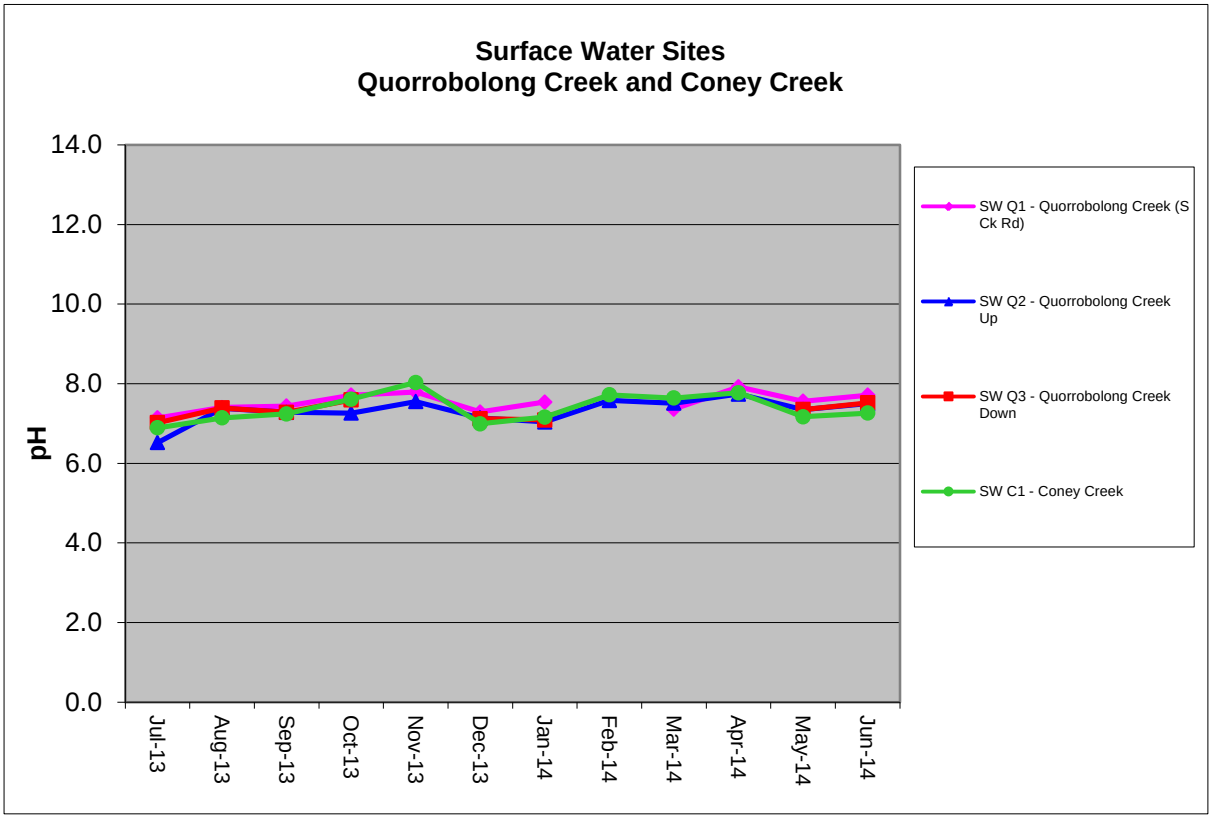
Appendix B:

Water Quality Data

Austar Coal Mine 2013-2014 Surface Water Monitoring Results Graphs – pH

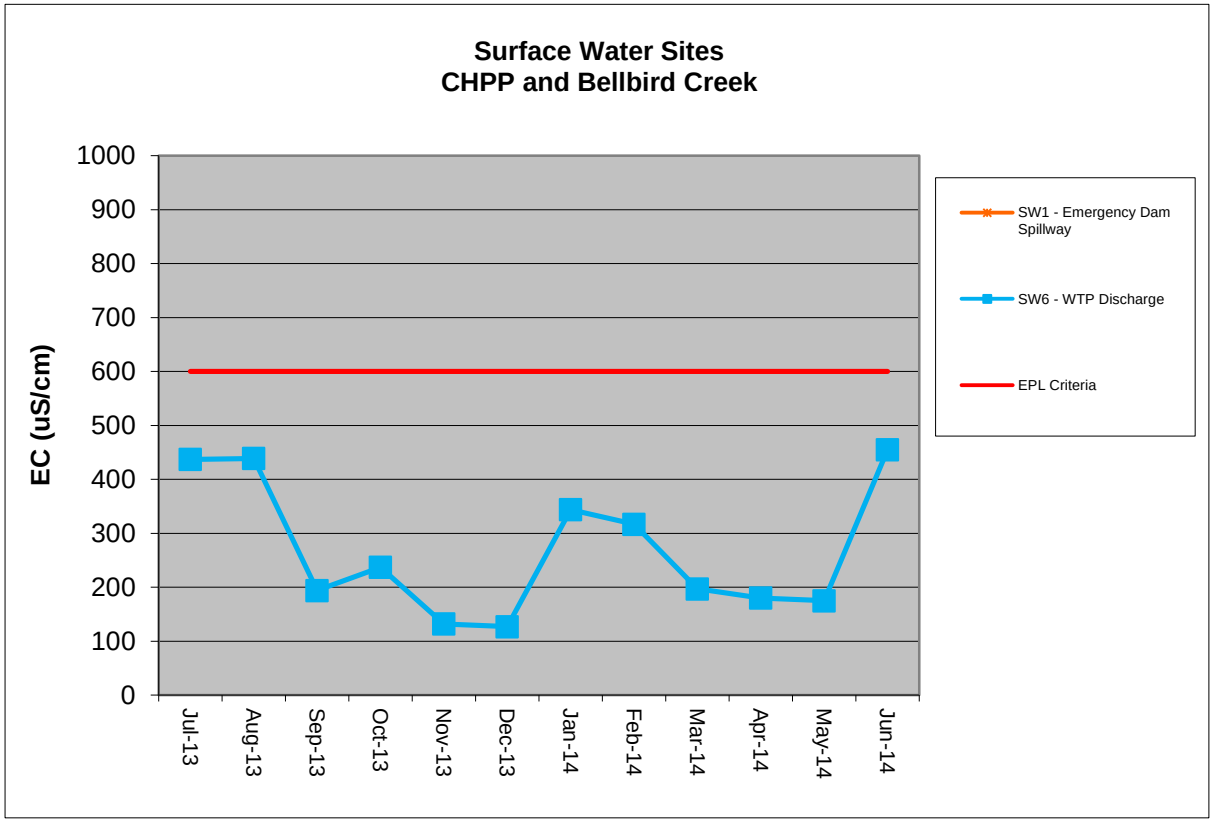


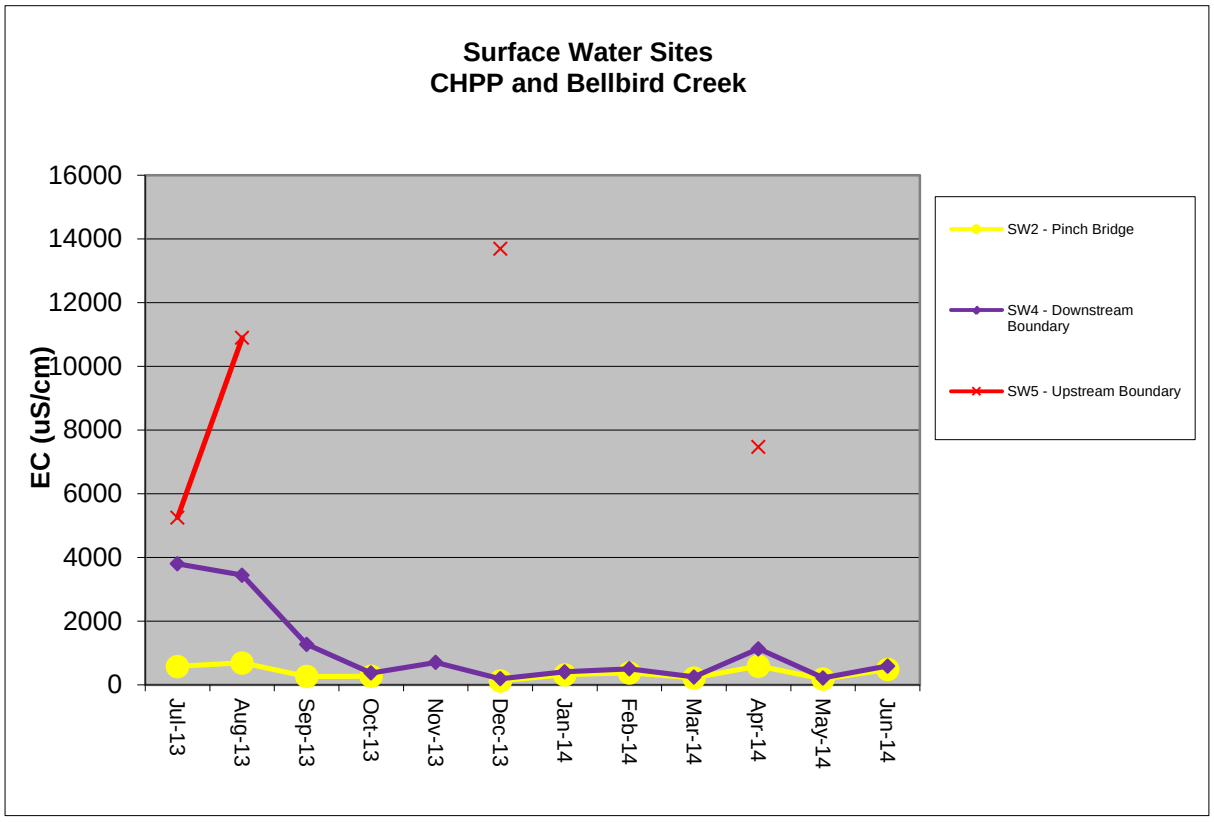


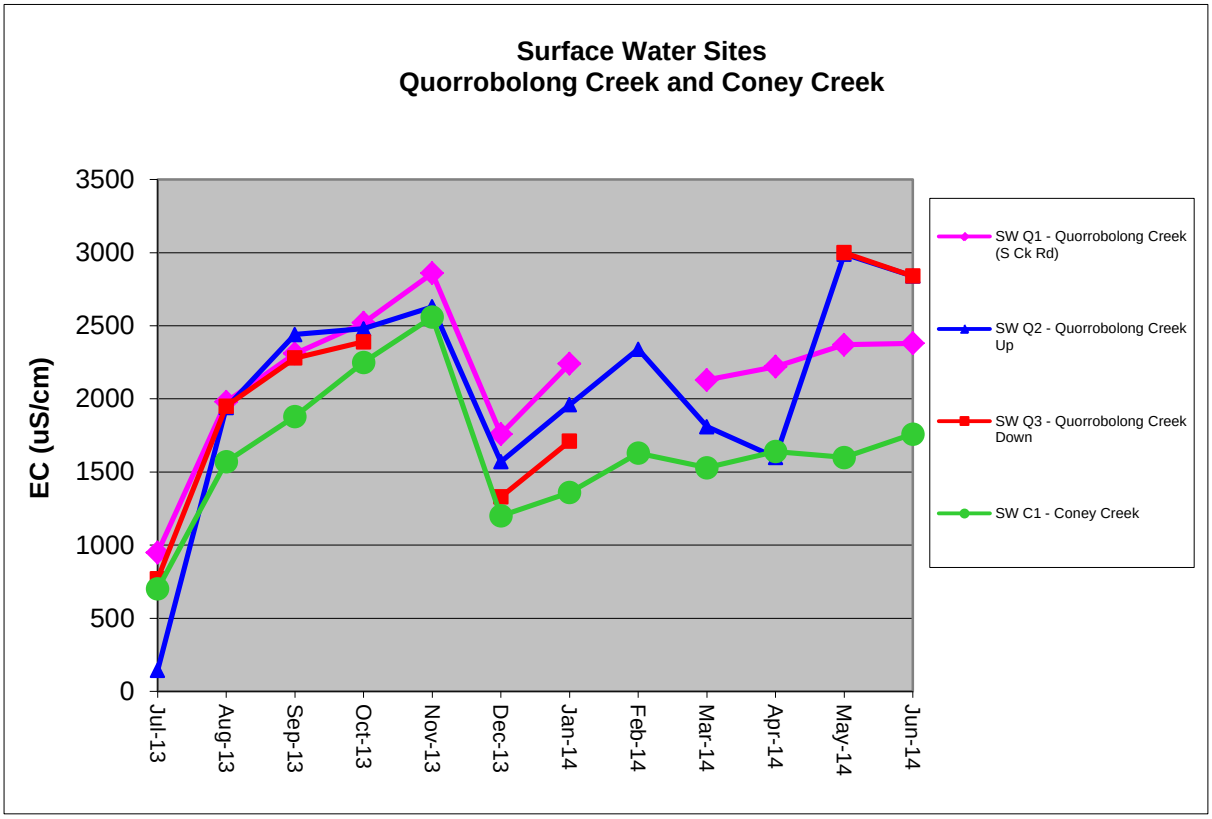


Note: For months where results are not shown the creeks were dry and a sample was not able to be collected.

Austar Coal Mine 2013-2014 Surface Water Monitoring Results Graphs - EC

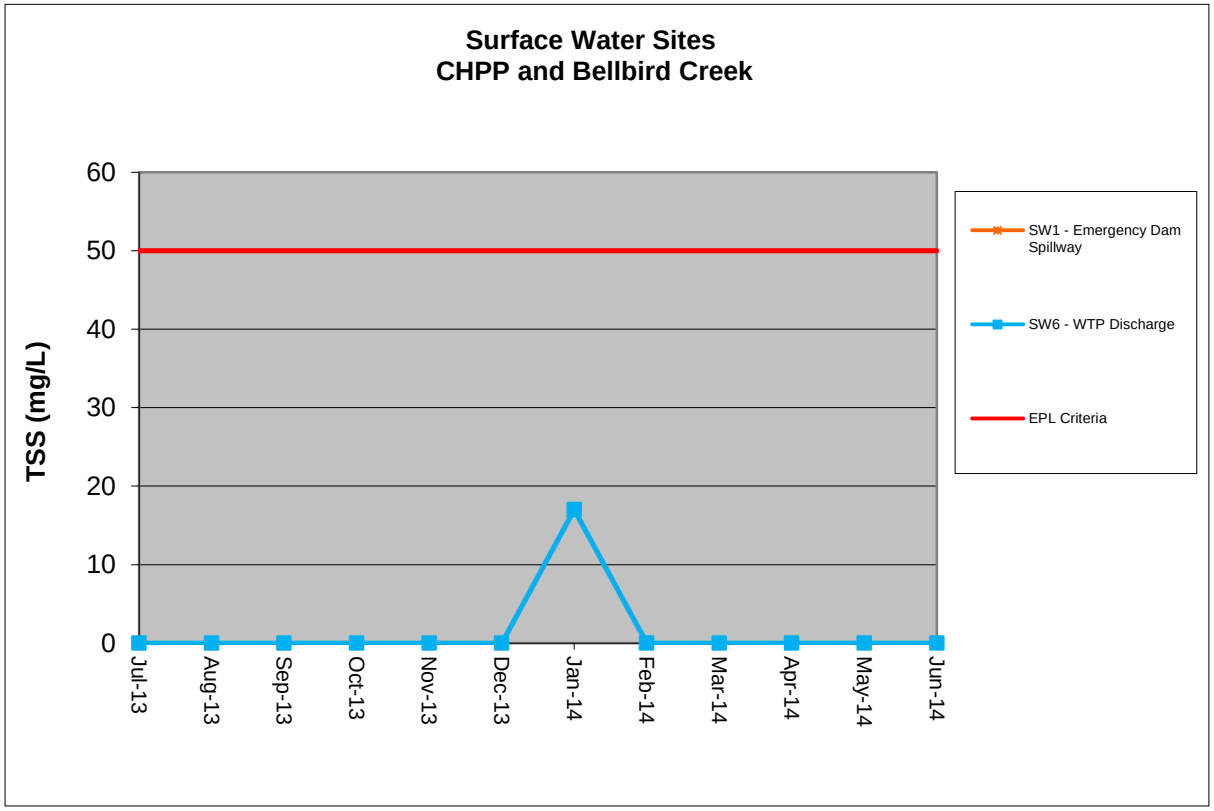


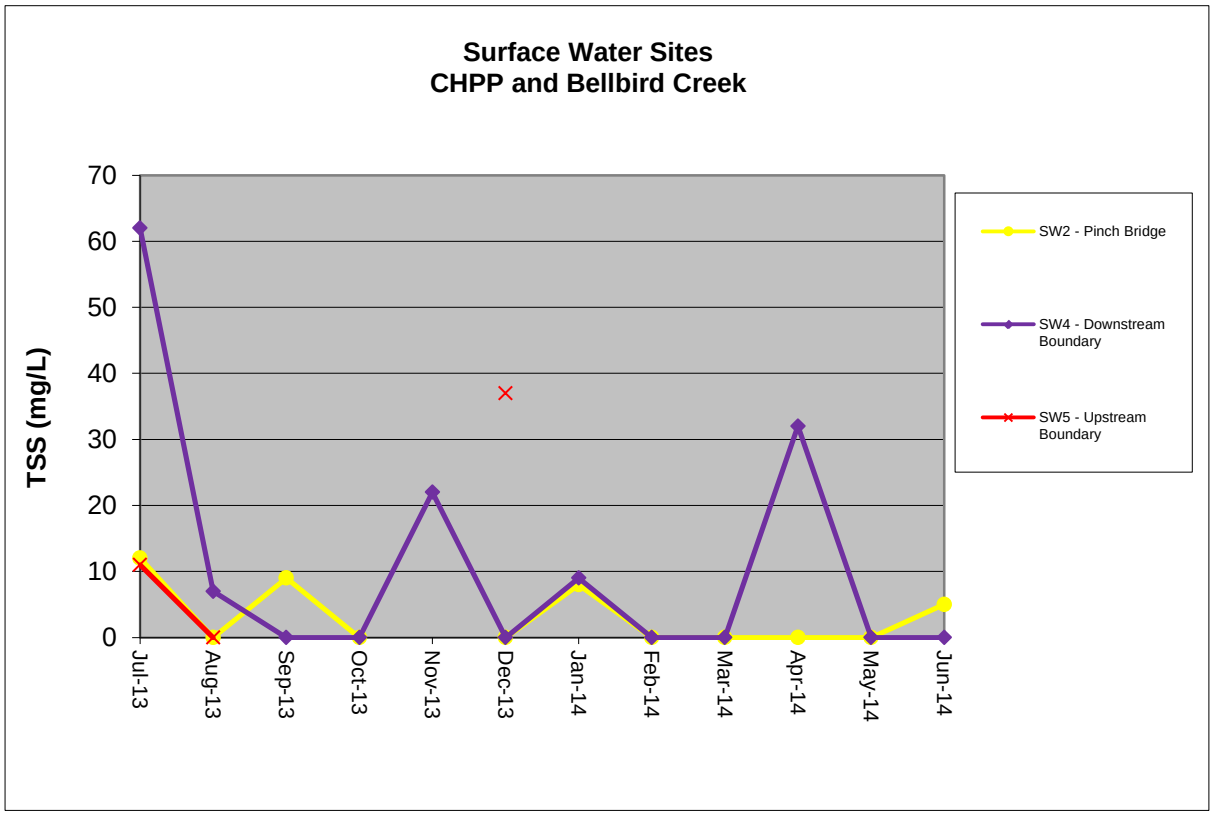


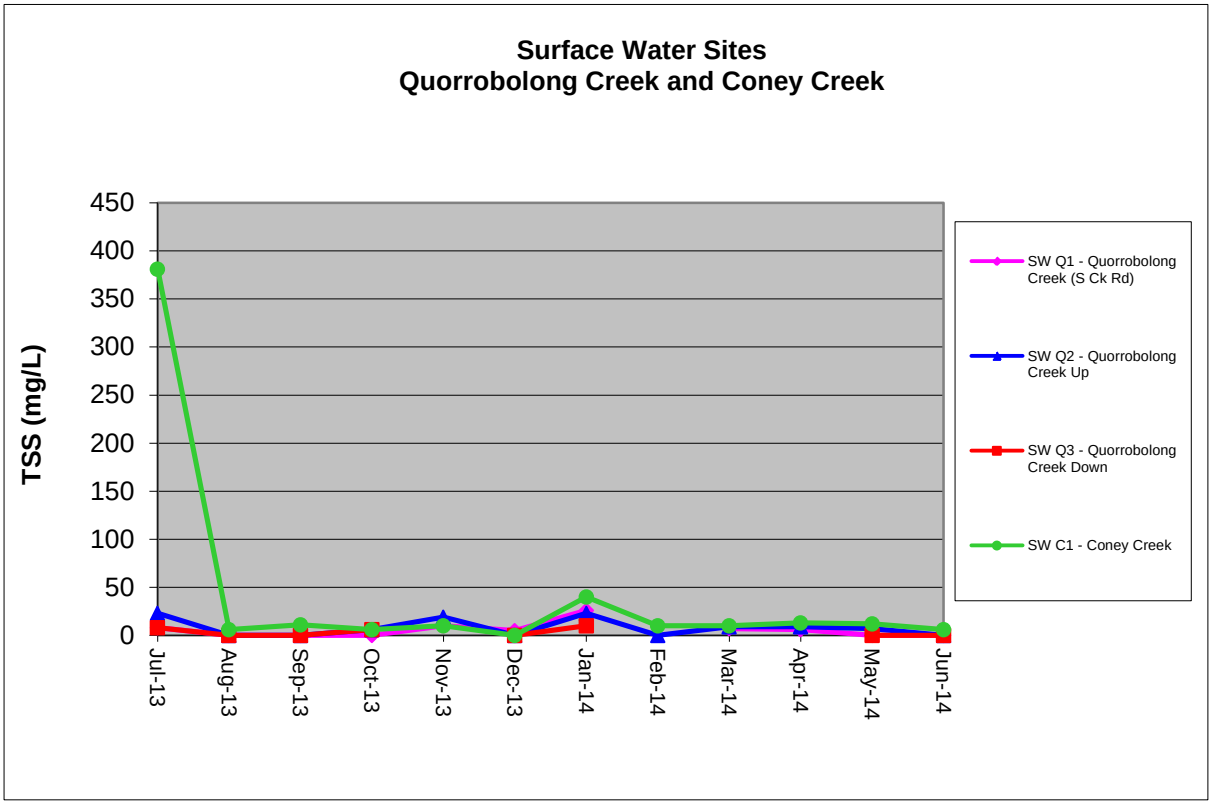


Note: For months where results are not shown the creeks were dry and a sample was not able to be collected.

Austar Coal Mine 2013-2014 Surface Water Monitoring Results Graphs - TSS

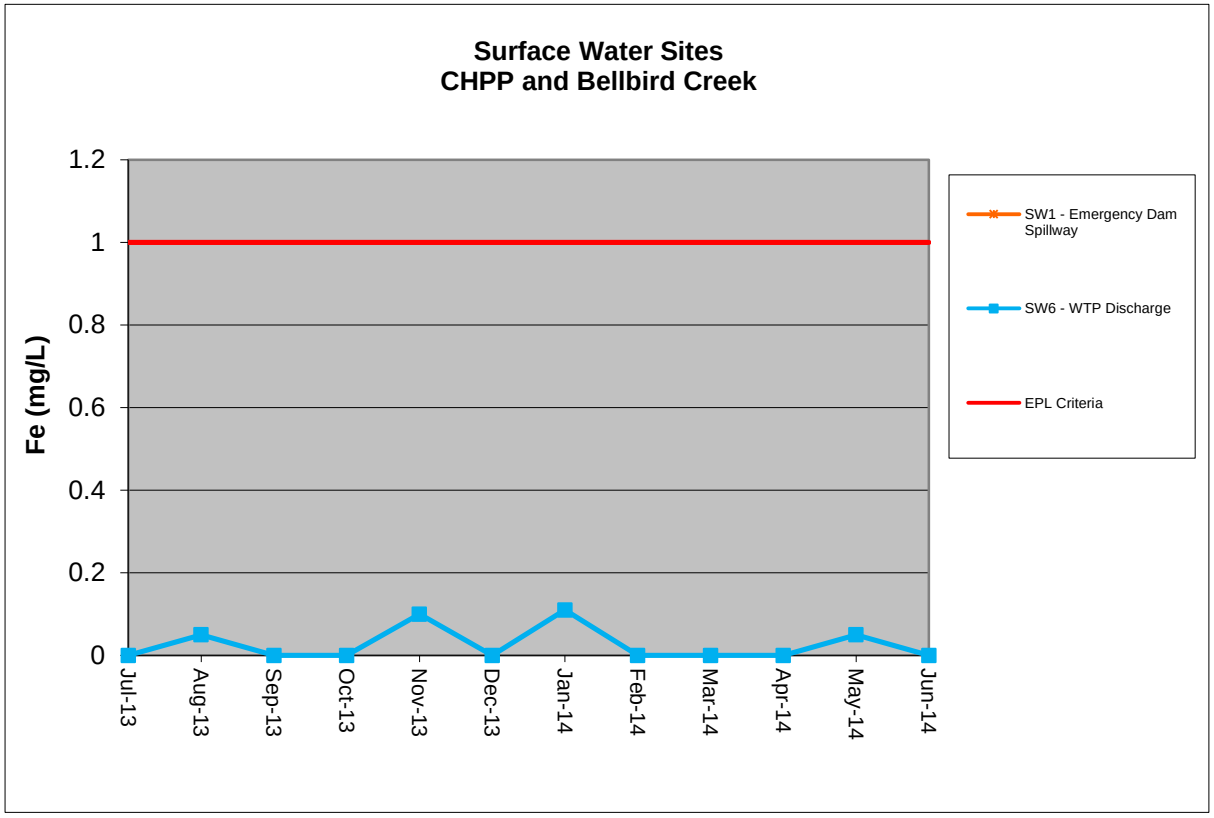


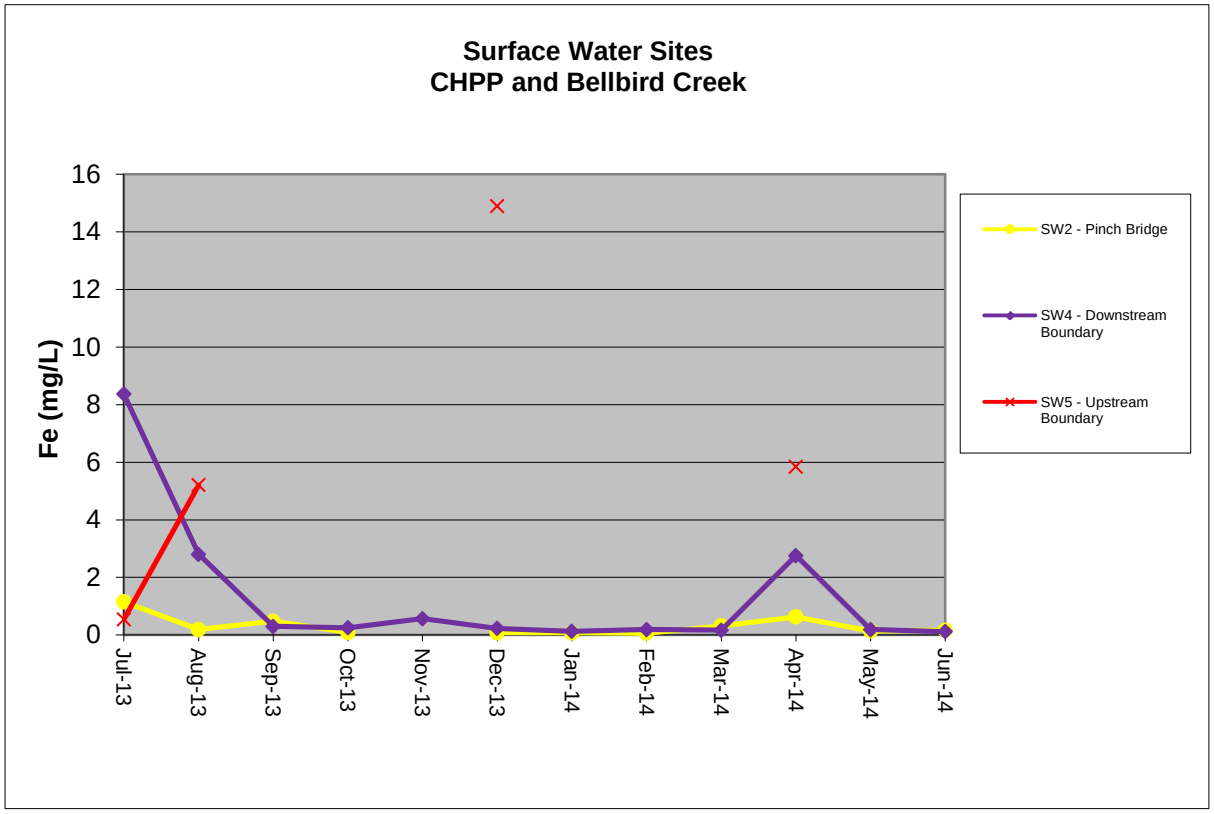


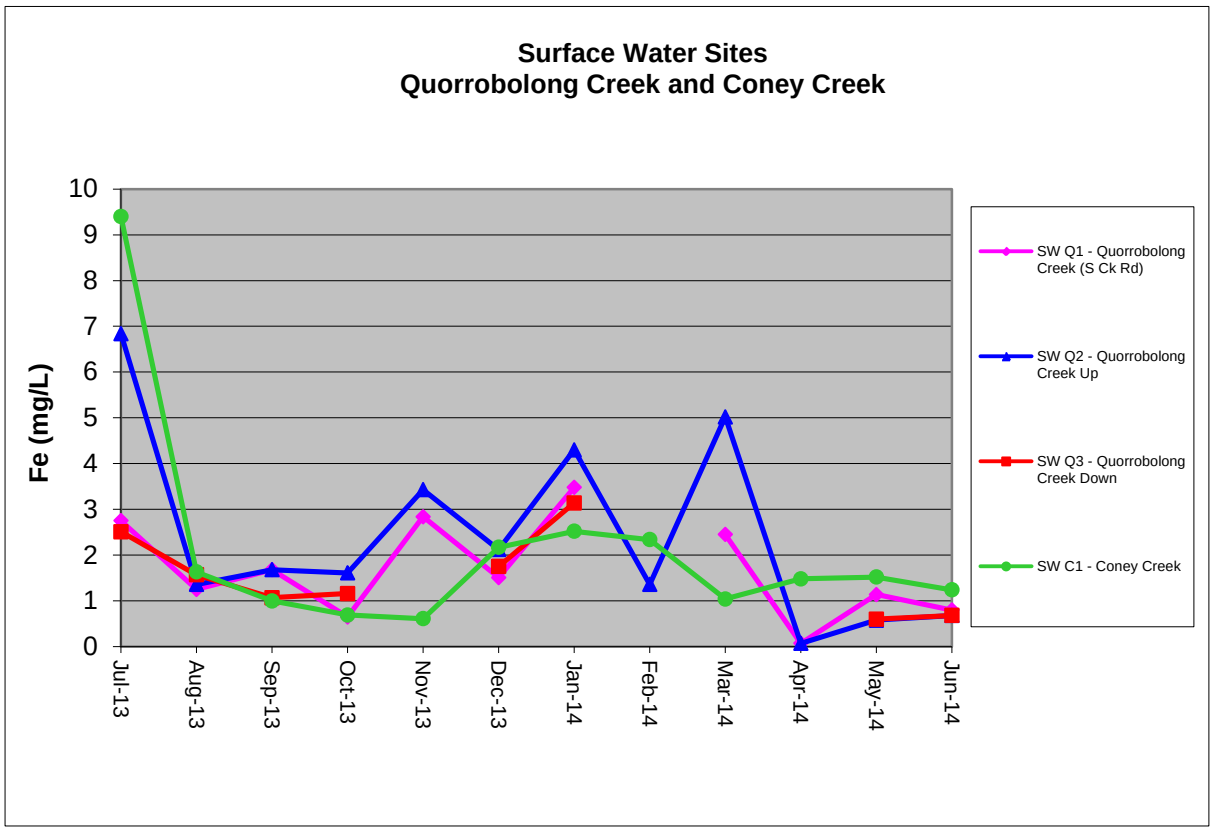


Note: For months where results are not shown the creeks were dry and a sample was not able to be collected.

Austar Coal Mine 2013-2014 Surface Water Monitoring Results Graphs - Fe





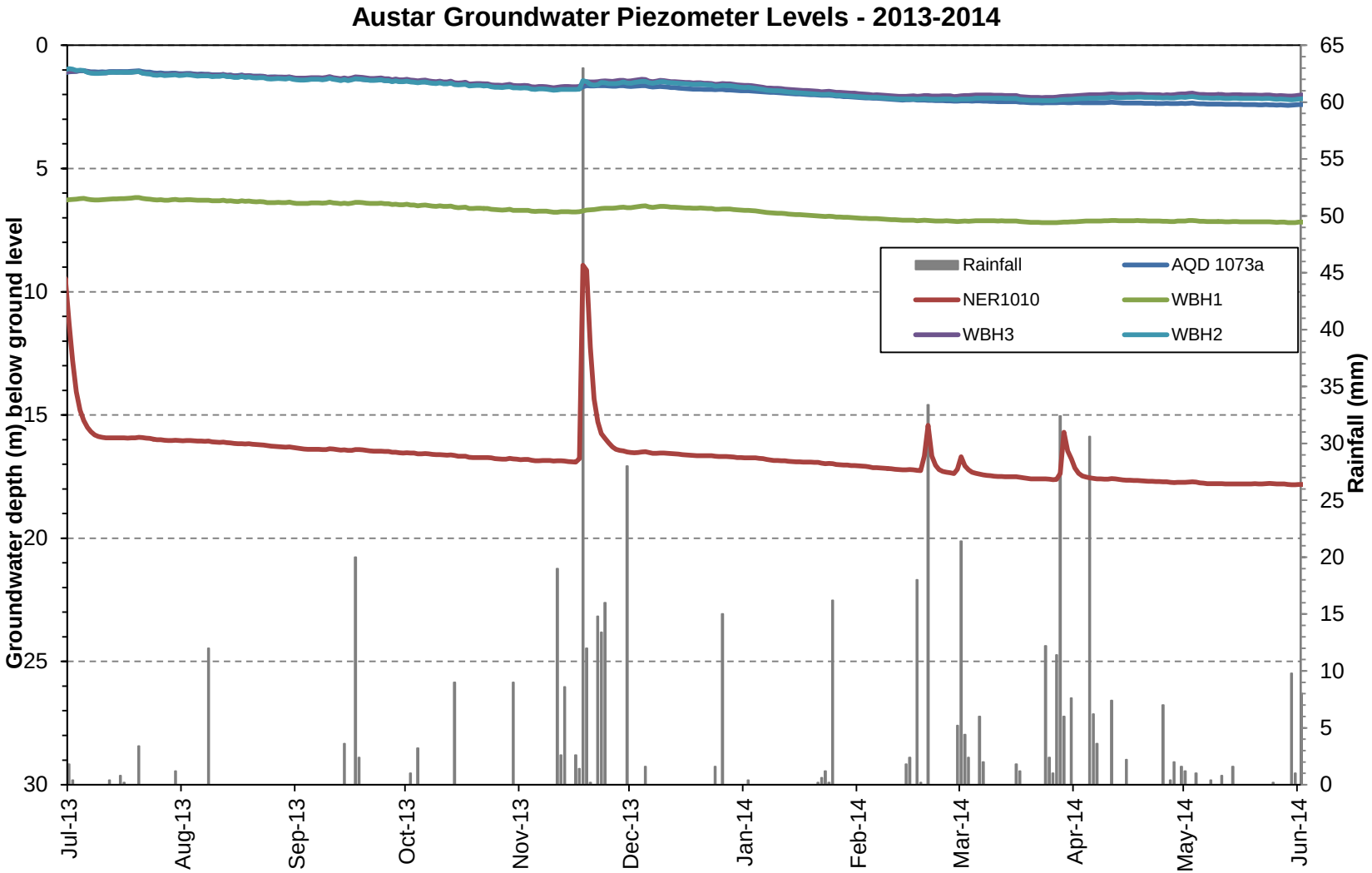


Note: For months where results are not shown the creeks were dry and a sample was not able to be collected.

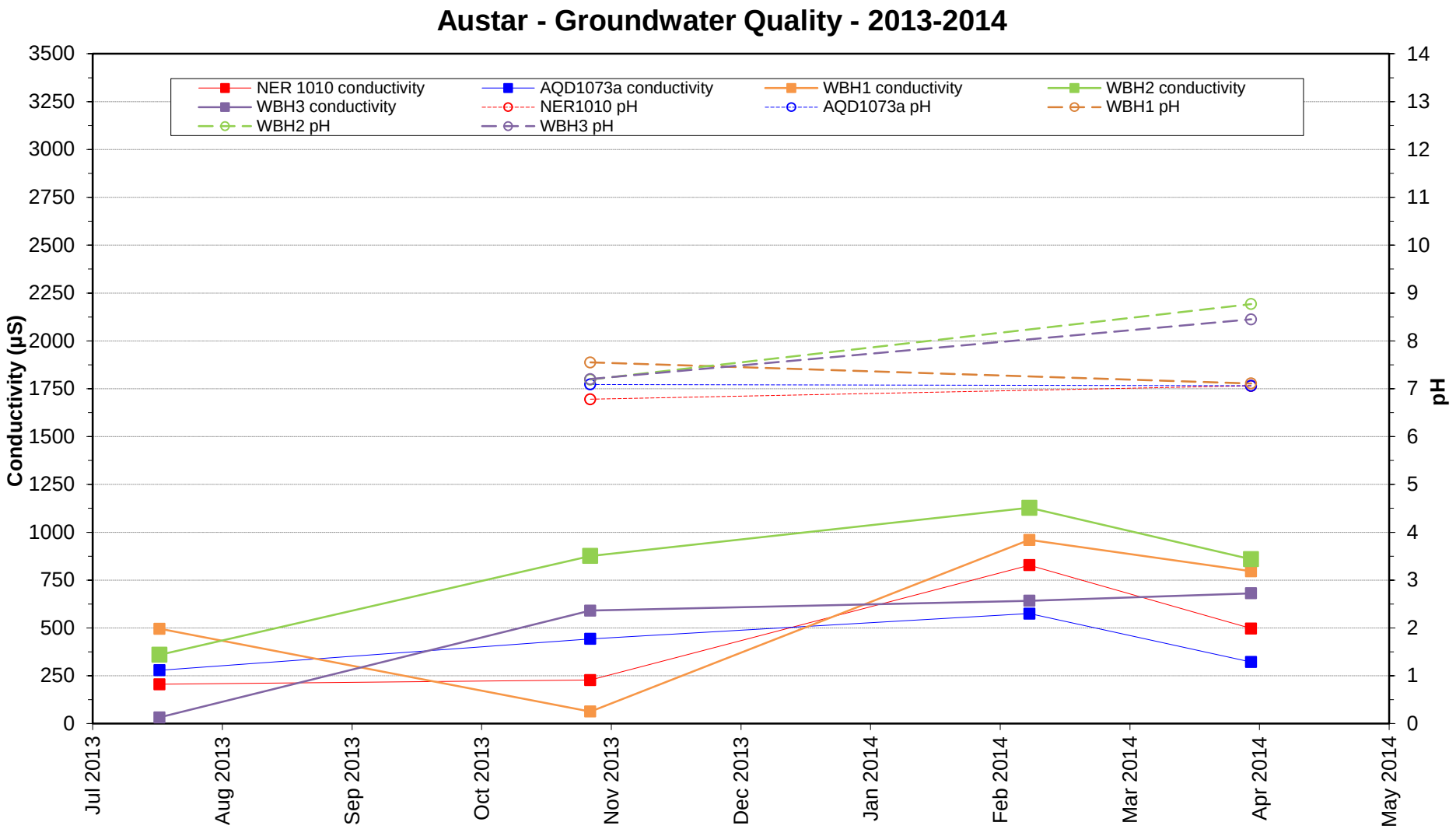
Appendix C:

Stage 2 Area Groundwater Level Monitoring Data

Groundwater Level Monitoring Data – Groundwater Depth and Daily Rainfall

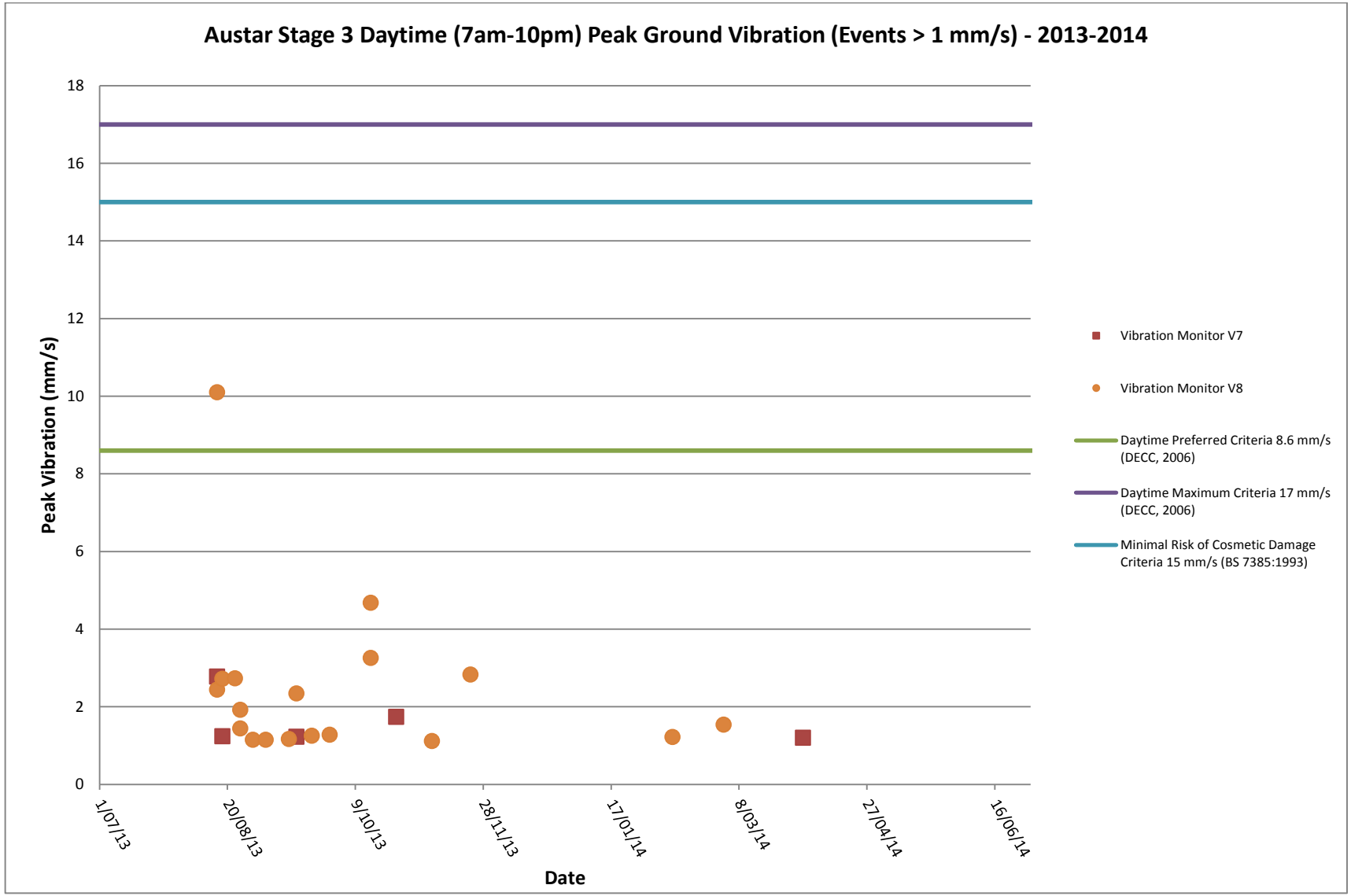


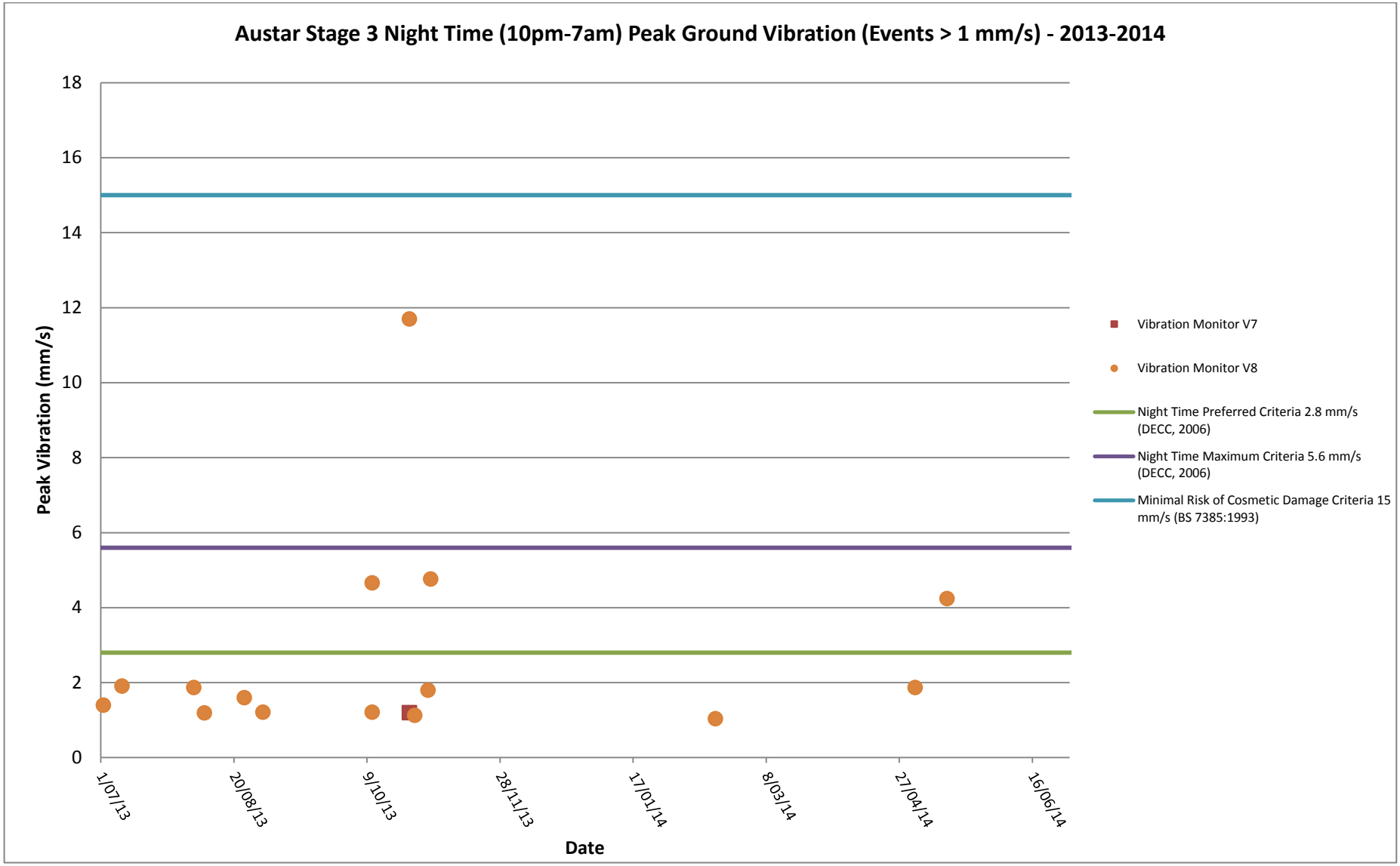
Groundwater Level Monitoring Data – pH and Conductivity



Appendix D:

Vibration Monitoring Data


Austar Stage 3 Daytime (7am-10pm) Peak Ground Vibration (Events > 1 mm/s) - 2013-2014
Peak Vibration (mm/s)
18
16
14
12
10
8
6
4
2
0
1/07/13
20/08/13
9/10/13
28/11/13
17/01/14
8/03/14
27/04/14
16/06/14
Date
Vibration Monitor V7
Vibration Monitor V8
Daytime Preferred Criteria 8.6 mm/s (DECC, 2006)
Daytime Maximum Criteria 17 mm/s (DECC, 2006)
Minimal Risk of Cosmetic Damage Criteria 15 mm/s (BS 7385:1993)


Austar Stage 3 Night Time (10pm-7am) Peak Ground Vibration (Events > 1 mm/s) - 2013-2014
Peak Vibration (mm/s)
18
16
14
12
10
8
6
4
2
0
1/07/13
20/08/13
9/10/13
28/11/13
17/01/14
8/03/14
27/04/14
16/06/14
Date
Vibration Monitor V7
Vibration Monitor V8
Night Time Preferred Criteria 2.8 mm/s (DECC, 2006)
Night Time Maximum Criteria 5.6 mm/s (DECC, 2006)
Minimal Risk of Cosmetic Damage Criteria 15 mm/s (BS 7385:1993)

Appendix E:

Subsidence – Stage 3 End of Panel Report, Longwall A7

YANCOAL
兖煤澳大利亚有限公司

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19 August 2014

Director General
Department of Trade and Investment- Division of Resources and Energy
PO Box 344
Hunter Regional Mail Centre NSW 2310

Attention: Mr Paul Langley

Dear Paul,

END OF PANEL REPORT- STAGE 3 LONGWALL A7

Austar Coal Mine Pty Ltd (Austar) completed extraction of Longwall A7 on 19 April 2014. Austar submits this End of Panel report for Longwall A7 in accordance with Condition 18 of Subsidence Management Plan (SMP) Approval for Austar Coal Mine Longwalls A7 to A10 (File No. 13/1867, approved on 3 June 2013).

This report encompasses the monitoring undertaken during the extraction of Longwall A7. The report consists of the analysis from:

- Appendix 1: Surface subsidence monitoring program;
- Appendix 2: Public safety monitoring and management plan;
- Appendix 3: Vibration monitoring plan
- Appendix 4: Biodiversity Management Plan

In summary, surface subsidence was of the order of 200mm, less than predictions. No perceptible impacts to the environment or increase in public safety risk have occurred. There has been no abnormal behavior that has required particular review.

Please contact myself on (02) 4993 7293 if you require further information regarding any of the data or interpretations summarised in this report.

Yours faithfully,

Adrian Moodie
Technical Services Manager
Austar Coal Mine

Appendix 1: Surface Subsidence Monitoring

1.1 Monitoring Results Summary

Subsidence monitoring has been undertaken in accordance with the Subsidence Monitoring Program. Summary results are displayed below and compared against maximum predicted subsidence from MSEC Report MSEC484 (2011) which supported the original Extraction Plan/SMP application; and MSEC Report MSEC650 (2013) which supported a modification to the Longwall A7 geometry (shortened started position and lengthened finish position) and associated Extraction Plan/SMP Revision 3. Included in **Table 1.1** are the Maximum Predicted subsidence parameters and actual observed subsidence parameters. The subsidence parameters are taken as the largest at any time from either Line A7 (centerline) or Line XL3 (cross line). The Maximum Predicted case was determined using the calibrated Incremental Profile Method.

Panel A7 is the first longwall panel in the Stage 3 area.

Table 1.1: Actual vs Maximum Predicted Subsidence Parameters

LW	Maximum Predicted Cumulative Subsidence (mm)	Actual Cumulative Subsidence (mm)	Maximum Predicted Cumulative Tilt (mm/m)	Actual Cumulative Tilt (mm/m)	Maximum Predicted Cumulative Tensile Strain (mm/m)	Actual Cumulative Tensile Strain (mm/m)	Maximum Predicted Cumulative Compressive Strain (mm/m)	Actual Cumulative Compressive Strain (mm/m)
After A7	450	232	2.5	1.5	0.6	0.9	0.9	0.8

Note: Predictions for strain after A7 have been converted from curvature predictions from the MSEC650 using the relationship strain = 15 x curvature. The factor of 15 was adopted (rather than 10 which is typically used in the Newcastle Coalfield) due to the higher depths of cover and better correlation with the local monitoring at Austar and Ellalong.

Further detailed analysis of the individual monitoring lines can be found in the attached report '*MSEC719 Longwall A7 End of Panel Subsidence Review Report*' as attached.

1.2 Analysis of Monitoring Results

See attached report *MSEC719 Longwall A7 End of Panel Subsidence Review Report*.

1.2.1 Comparison to Impact Assessment Criteria

Chapter 3 of the subsidence prediction report (MSEC650) details the anticipated impacts on natural features and surface infrastructure. **Table 1.2** summarises these impacts and makes comment as to the level of impact created by A7 subsidence as compared to maximum predicted subsidence parameters.

Table 1.2- Impact Assessment Criteria Post Longwall A7 Mining

Item	Subsidence Impact Assessment	Actual Observation / Occurrence	Action
Cracking of alluvial creek beds	None within SMP area	NA	Nil
Drainage lines	Potential for minor shallow isolated cracking around tensile zones of perimeter of longwalls	None observed.	Nil
Steep slopes (southern side A7 near start and southern side 0f A7 along chain pillar last half of panel)	Tilts 5.5mm/m, Strains ≤1.35mm/m after LWA10. Potential for minor cracking and unlikely to cause any long term impact	Tilt 1.5mm/m, Tensile Strain 0.9mm/m potentially as a result of downward slope movement near top of hill.	Continue to monitor.
Quorrobolong Rd	150mm after LWA7 and 0.7mm/m Tilt. After LWA10 1250mm, Tilt 5.0mm/m, Strains 0.3-1.1mm/m. Minor surface cracking to 25mm	Subsidence 66mm. Tilt 1.9mm/m Strains to 4.0mm/m. Tilts and strains higher but appear disturbed. No visual sings of impact	Nil
Electrical Infrastructure	Unlikely for any adverse impact	No impact observed.	Re-contact Ausgrid regarding line roller installation as per M.Plan
Telecommunications Cables	After LWA10 1600mm, Tilt ≤4mm/m, Strains 0.3-0.45mm/m. Moderate likelihood of damage.	OTDR testing completed. No loss of transmission.	Continue to monitor as per M.Plan
Rural building structures	No expected impacts	None reported.	Nil
Other structures/dams	Minimal impact	None reported	Nil
Archaeological Sites	Minor cracking with no adverse impact	None reported	Nil

1.2.2 Comparison to Previous Panels

This is the first panel of the Stage 3 mining area. Compared to A3 which was a similar geometry and first panel in the Stage 2 sequence of longwalls, the following is noted:

- The maximum observed subsidence due to Longwall A7 was around 1.5 times that observed due to Longwall A3. The higher subsidence is consistent with prediction (also 1.5 times higher), which is due to Longwall A7 having a greater overall void width than Longwall A3 (237m versus 227m) and due to the slightly shallower depth of cover and slightly thicker seam in the locations of the transverse monitoring lines.
- The maximum observed subsidence was around half of the maximum predicted subsidence for both Longwalls A3 and A7. The Incremental Profile Method tends to be more conservative (i.e. over-predict) the subsidence for first panels, due to the lower magnitudes of subsidence when compared with subsequent longwalls in the series.

- The maximum observed tilt due to Longwall A7 was around 2 times that observed due to Longwall A3. This ratio is higher than that for subsidence (1.5 times), as observed tilt profiles with lower magnitudes tend to be slightly irregular, due to the larger influence of survey tolerance and disturbed survey marks.

- The maximum observed strains for Longwall A7 were 2 to 3 times greater than those for Longwall A3. It is noted, however, that the maximum strains for Longwall A7 were localised and appear to be associated the surface topography (top of hill effects) not associated with A3, and likely disturbed survey marks. Away from these locations, the observed strains due to Longwall A7 were less than those predicted based on conventional movements.

  Consequently variations to A3 are either predicted or understood and the prediction method still appears to be robust not requiring re-calibration.

Table 1.3- Subsidence parameters after Stage 2 (A3) and Stage 3 (A7) first Longwalls

LW	Maximum Predicted Incremental Subsidence (mm)	Actual Incremental Subsidence (mm)	Maximum Predicted Incremental Tilt (mm/m)	Actual Incremental Tilt (mm/m)	Maximum Predicted Incremental Tensile Strain (mm/m)	Actual Incremental Tensile Strain (mm/m)	Maximum Predicted Incremental Compressive Strain (mm/m)	Actual Incremental Compressive Strain (mm/m)
A3	295	157	1.5	0.7	0.2	0.2	0.4	0.4
A7	450	232	2.5	1.5	0.6	0.9	0.9	0.8

1.2.3 Comparisons to Predictions in SMP

See sections 1.2 and 1.2.1 above.

1.3 Trends in Monitoring Results

Monitoring data is revealing trends that match predicted profiles, with subsidence parameters around maximum predicted and subsidence being controlled by compression of the strata surrounding the chain pillars. The most recent survey conducted for A7 was approximately 2 months after the completion of mining. The trends in the monitoring data and overall levels of subsidence indicate that final subsidence parameters due to A7 will equivalent to or be less than maximum predicted with minor variation in strain attributed to a localised movement near the top of a steep slope that has not resulted in any visible impact.

1.4 Subsidence Management Actions

Nil actions required. Continue following management plans.

Appendix 2: Public Safety Monitoring and Management Plan

2.0 Summary

During routine subsidence monitoring and on occasions the area was being accessed for other purposes the following items were inspected as per the Public Safety Management Plan:

- Surface cracking;
- Surface humps;
- Step changes in landform;
- Serviceability of roads and access tracks;
- Slope or boulder instability;
- Other sign of subsidence.

Of all the inspection occasions no evidence of any of the above could be observed (Also refer to **Table 1.2**). Inspections also confirmed that no safety issues manifested and no physical signs of subsidence were observed.

Appendix 3: Vibration Monitoring

3.1 Monitoring Results Summary

Vibration monitoring has been undertaken in accordance with the Noise and Vibration Management Plan.

Monitoring was undertaken at locations V7 and V8 during extraction of LWA7 (refer to **Figure 3.1**).

Monitors were set to monitor vibration continuously, and also to record a waveform when vibration exceeded 1mm/sec in any axis. Results of vibration monitoring greater than 1mm/sec are shown in **Figures 3.2** and **3.3**. Periods which recorded vibration less than 1mm/sec are not shown on the graphs.

Guideline values for annoyance (*Assessing Vibration: a technical guideline, DECC February 2006*), and for minimal risk of cosmetic damage (*BS7385:1993*) are included with the graphed results.

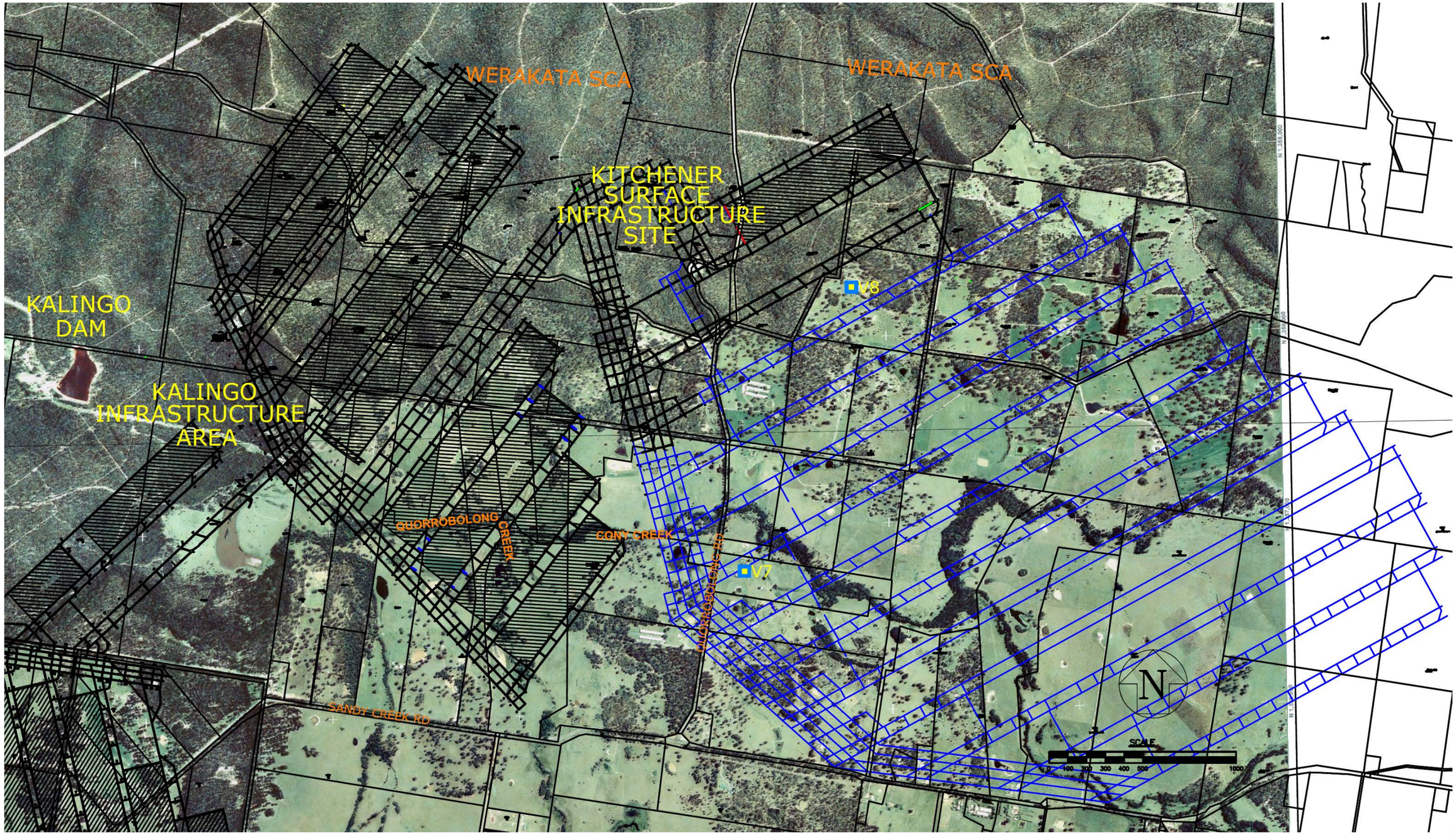


Figure 3.1 Austar Vibration Monitoring Network (V7 and V8)

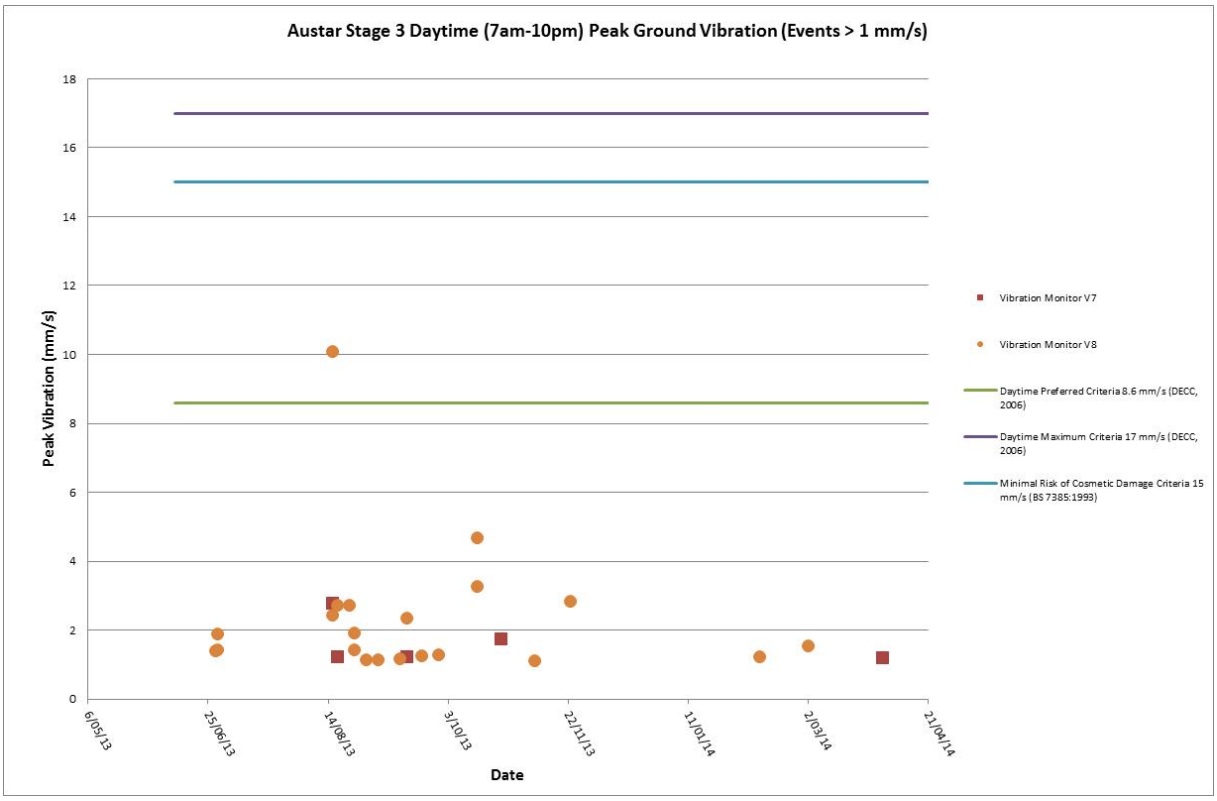


Figure 3.2 Vibration Monitoring Results – Daytime

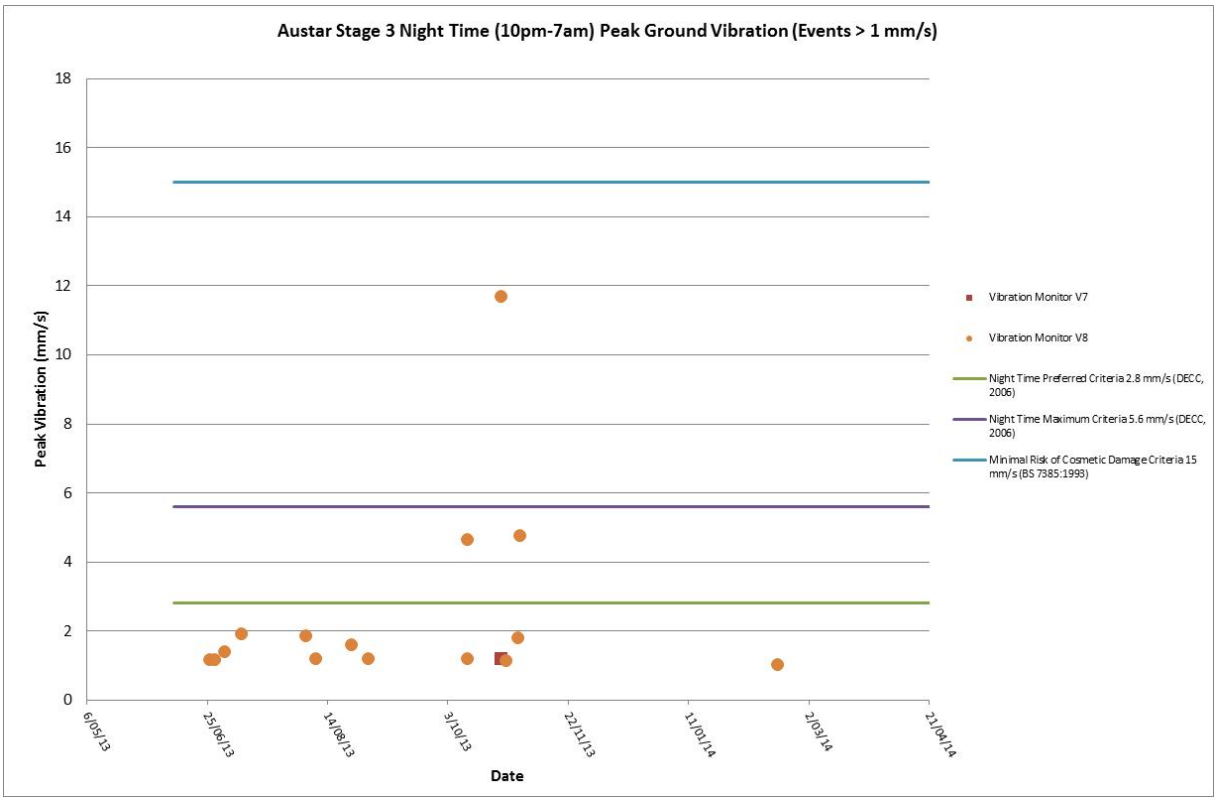


Figure 3.3 Vibration Monitoring Results – Night

3.2 Analysis of Monitoring Results

Results indicate that vibration from the extraction of Longwall A7 has been event based in nature, typically generated by strata failures from material overlying the mining area. The majority of vibration events are less than 4 mm/sec, with only 2 events greater than 6 mm/sec over the period of extraction of A7. There were no events greater than 11.7 mm/sec.

Over the period of monitoring (June 2013 to April 2014), one event exceeded the maximum criteria for human response to vibration during the night period. One exceedance of the maximum criteria over the extraction of Longwall A7 is not considered to be significant. It is important to note that the vibration criteria are non-mandatory (*DECC 2006*) so are used as a monitoring tool to assess possible annoyance. Also, due to the vibration being strata generated, the timing of vibration events cannot be controlled, as would be the case in say pile driving, so operational controls are not feasible in this case.

No events exceeded the guideline value where a minimal risk of cosmetic damage to building structures may occur (15mm/sec).

Ditton Geotechnical Services (DGS) previously conducted a review of adequacy of the Stage 2 Vibration Monitoring Program as part of the Independent Environmental Audit Austar Coal Mine November 2011 (Trevor Brown and Associates, April 2012). DGS noted:

"The only issue of concern from this audit period is whether the frequency of vibration events is becoming a significant issue with local residents. It is noted that the magnitude of the vibrations do not exceed minimum limits for cosmetic damage and it is not practical to impose operational constraints on the mine to reduce the frequency of the vibration events from occurring."

As noted in the DGS comment, it is not practical to impose operational constraints on the mine to reduce vibration events. To manage vibration, Austar has continued to provide adequate community access to vibration monitoring information in regular underground mine status reports to landholders over the active Stage 3 mining area. These status reports include vibration monitoring and mining status information to affected residents.

3.3 Trends in Monitoring Results

This is the first longwall panel in the Stage 3 mining area. There were more vibration events between the start of the longwall in June 2013 and November 2013, than there were after November 2013. Mining in Longwall A7 was completed on 19 April 2014. Vibration results are similar in magnitude to those from the previous Stage 2 mining area.

3.4 Management Actions

No management actions relating to vibration have been necessary. Vibration monitoring should continue for Stage 3 as per the Stage 3 Noise and Vibration Management Plan.

Appendix 4: Biodiversity Monitoring

6.1 Monitoring Results Summary

A Biodiversity Management Plan (BMP) is being implemented as part of the Extraction Plan for LWA7 to LWA10. The purpose of the BMP is to describe the ecological management strategies, procedures, controls and monitoring programs that are to be implemented for the management of flora and fauna as a result of subsidence related biodiversity impacts described in the Austar Stage 3 Modification Environmental Assessment (Umwelt 2011) and within the Austar Coal Mine LWA7-A10 Modification - Stage 3 Area Environmental Assessment (Umwelt 2013).

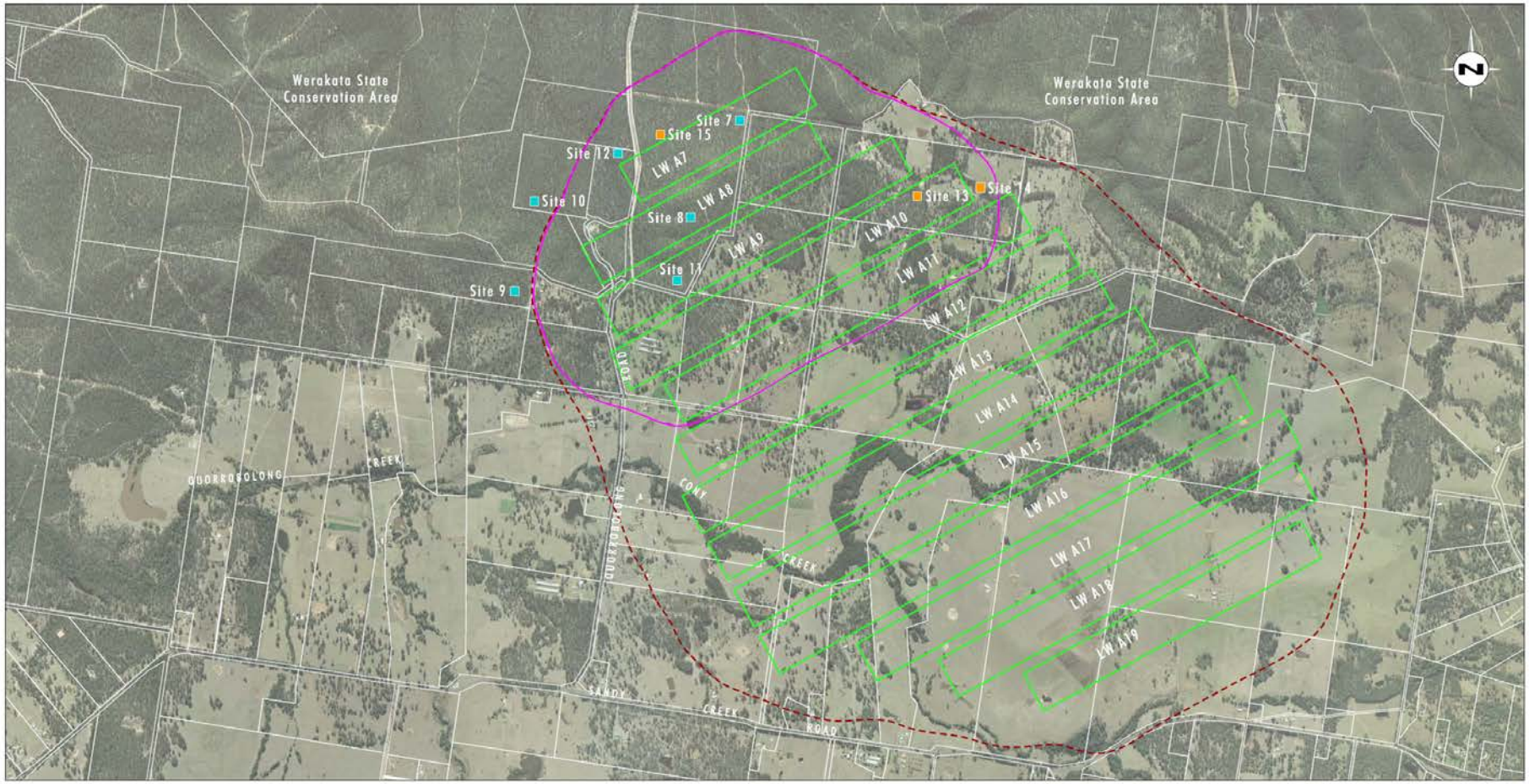
Secondary workings undertaken as part of Stage 3 mining are not anticipated to have a significant impact on biodiversity. However, in order to assess any potential impacts, a detailed Monitoring Program has been developed for the Extraction Plan area. The monitoring specifically focuses on the Lower Hunter Spotted Gum – Ironbark Forest EEC and River Flat Eucalypt Forest EEC which occur on the drier slopes and ridges of the Extraction Plan area and on the drainage flats/lower slopes respectively, and threatened species identified within the subsidence zone of LWA7 to LWA10.

Monitoring is undertaken using a mixture of bi-annual monitoring (one survey in autumn and one in spring), and annual monitoring (for threatened species monitoring to coincide with flowering events). Monitoring locations are shown in **Figure 6.1**.

There are eight routine monitoring locations above the mining area and two reference sites. The program is arranged so that monitoring sites will be added to and removed from the program progressively as mining proceeds. For example, sites influenced by mining of LWA8 will be monitored for baseline data 12 months prior to the mining of that longwall, and will continue after the mining of that longwall. Additional sites for future longwall panels (i.e. LW A11 onwards) will be commenced prior to mining of these panels.

For the current stage of the Stage 3 program the following key methods are utilised:

- permanent vegetation sampling quadrats;
- ecological condition assessment;
- photographic monitoring; and
- targeted threatened species monitoring.



Source: Longwall Layout: Austar Coal Mine, Cadastre: LPI NSW, Aerial Photography: AAM Hatch 2006

Legend

- Layout for Stage 3 Longwall Panels, incorporating LW A7-A10 Modification
- Extraction Plan Area
- 20mm Subsidence Contour for Stage 3 Longwall Panels
- Current Monitoring Location
- Proposed Monitoring Location

FIGURE 8.1

Monitoring Locations

File Name (A4): R06/3264_057.dgn
20131023 10.10

Figure 6.1 – Ecological Monitoring Locations

6.2 Analysis of Monitoring Results

Monitoring undertaken prior to and up to the completion of LWA7 has included baseline monitoring in 2012, and monitoring in 2013, up to the Autumn 2014 survey. The results arising from the data obtained from the monitoring surveys undertaken to date are detailed below.

- Longwall mining has now passed under monitoring Site 7 and in close proximity to Site 12 and 15. Ongoing monitoring will consequently be tracking potential impacts resulting from longwall mining.
- No discernible change was observed in the vegetation or condition of the Stage 3 monitoring sites during the autumn 2014 monitoring from the spring 2013 monitoring event.
- No changes have been observed at any of the monitoring sites occurring over longwalls that would be attributable to the impacts of longwall mining.
- As the vegetation of these sites is currently considered stable and there are no impacts as a result of longwall mining, no management recommendations are considered necessary at this point in time.
- The targeted threatened species monitoring locations revealed these species in a good state of health.
- There was no myrtle rust identified at any of the locations.
- No weed infestation was identified at any of the sites with only five introduced species recorded across five sites. Lantana was observed at two sites at a low density.
- One of the Stage 3 reference sites (Site 10) has been subject to bushfire since the spring 2013 monitoring event. Shrubs and groundcover were largely absent in the autumn 2014 monitoring event, however the canopy was largely un-impacted. It is likely that this vegetation will recover over time and will provide an opportunity to monitor how this vegetation community responds following a bushfire event.

6.3 Trends in Monitoring Results

To date there is no evidence of any impacts on ecological features as a result of longwall mining.

6.4 Management Actions

Nil management actions required to date in relation to biodiversity.

msec
mine subsidence
ENGINEERING CONSULTANTS

Austar Coal Mine:

Stage 3 – Longwall A7

Longwall A7 End of Panel Subsidence Monitoring Review Report

DOCUMENT REGISTER

Revision	Description	Author	Checker	Date
01	Draft Issue	JB	-	12th Aug 14
A	Final Issue	JB	PD	19th Aug 14

Report produced to:- Support the End of Panel Report for Longwall A7 which will be issued to the Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS).

Associated reports:-

MSEC309 (Revision D) – The Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Natural Features and Surface Infrastructure Resulting from the Extraction of Proposed Austar Longwalls A6 to A17 in Support of a Part 3A Application (September 2008).

MSEC484 (Revision A) – Stage 3 – Longwalls A7 to A19 – Subsidence Predictions and Impact Assessments for Natural Features and Surface Infrastructure in Support of a Modification to the Development Consent (May 2011).

MSEC650 (Revision A) – Stage 3 – Longwalls A7 to A10 - The Effects of the Proposed Modified Commencing End of LWA8 and Modified Finishing Ends of LWA7 to LWA10 in Stage 3 at Austar Coal Mine on the Subsidence Predictions and Impact Assessments (October 2013).

Background reports available at *www.minesubsidence.com*:-

Introduction to Longwall Mining and Subsidence (Revision A)

General Discussion of Mine Subsidence Ground Movements (Revision A)

Mine Subsidence Damage to Building Structures (Revision A)

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Tables

Tables are prefixed by the number of the chapter in which they are presented.

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Figures

Figures are prefixed by the letter of the appendix in which they are presented.

Figure No.	*Description*	*Appendix*
Fig. A.01	Observed and Predicted Incremental Subsidence, Tilt and Strain Along Monitoring Line A7 due to Longwall A7	App. A
Fig. A.02	Observed and Predicted Incremental Subsidence, Tilt and Strain Along Monitoring Line XL3 due to Longwall A7	App. A
Fig. A.03	Observed and Predicted Incremental Subsidence, Tilt and Strain Along Monitoring Quorrobolong Road due to Longwall A7	App. A

Drawings

Drawings referred to in this report are included in Appendix B at the end of this report.

Drawing No.	*Description*	*Revision*
MSEC719-01	General Layout	A
MSEC719-02	Surface Level Contours	A
MSEC719-03	Depth of Cover Contours	A
MSEC719-04	Seam Thickness Contours	A
MSEC719-05	Predicted Incremental Subsidence due to Longwall A7	A

1.1. Background

Austar Coal Mine Pty Limited (Austar) has completed the extraction of Longwall A7 in Stage 3 at Austar Coal Mine (the Mine), which is located in the Newcastle Coalfield in New South Wales. The layout of the longwalls in Stage 3 is shown in Drawing No. MSEC719-01, in Appendix B. The extraction of Longwall A7 commenced on the 14th June 2013 and was completed on the 19th April 2014.

Mine Subsidence Engineering Consultants (MSEC) was previously commissioned by Austar to prepare subsidence predictions and impact assessments for the proposed longwalls in Stage 3 at the Mine. Report No. MSEC309 (Revision D) was issued on the 18th September 2008 in support of the Part 3A Application for these longwalls. The Minister for Planning granted Austar project approval for mining in Stage 3 in September 2009 (PA 08_0111).

Austar then proposed a modification to the layout of the longwalls in Stage 3 at the Mine. Report No. MSEC484 (Revision A) was issued on the 13th May 2011 in support of the S75W Modification of the Project Approval and included impact assessment of the natural and built features. The modification of the Stage 3 longwalls was approved under delegation from the Minister for Planning and Infrastructure in March 2012.

Austar then proposed to shorten the commencing (i.e. north-eastern) end of LWA7 by 70 metres by varying the approved first workings. A letter was issued by Austar to the Department of Planning & Infrastructure (DP&I) on the 21st February 2013 in support of this variation to first workings. Austar received approval for the modified commencing end of LWA7 on the 21st February 2013.

Austar then proposed to lengthen the finishing (i.e. south-western) end of LWA7 by 101 metres from the approved position. Report No. MSEC650 (Rev. A) was issued on the 15th October 2013 in support of this modification application. Austar received approval for the modified finishing end of LWA7 on the 17th December 2013.

In accordance with Condition 18 of the Subsidence Management Plan Approval for Longwall A7, this report provides comparisons between the observed and predicted subsidence movements for the monitoring lines in Stage 3 resulting from the extraction of this longwall.

1.2. Mining Geometry

The layout of the longwalls in Stage 3 is shown in Drawing No. MSEC719-01, in Appendix B. The overall length of Longwall A7 is 1,032 metres and the overall void width, including first workings, is 237 metres. This longwall is the first in the series in Stage 3 of the Mine.

The depth of cover to the Greta Seam, directly above Longwall A7, varies between a minimum of 455 metres towards the northern most corner of the longwall and a maximum of 520 metres above the maingate towards the middle of the longwall.

The thickness of the Greta Seam within the extent of Longwall A7 varies between 6.0 metres and 6.5 metres. The Longwall Top Coal Caving equipment extracted the bottom 3.3 metres of the seam and partially recovered (no caving between chocks 40 through to 70) on average 65 % of the top coal from the commencing end up to longwall chainage 660 metres, then recovered (full face width) on average 70 % of the top coal up to chainage 300 metres, and then recovered no top coal (rear AFC removed) through to the longwall finishing end.

2.1. Introduction

The mine subsidence movements resulting from the extraction of Longwall A7 were monitored using the following:-

- Line A7,
- Line XL3, and
- Quorrobolong Road Line.

The locations of these monitoring lines are shown in Drawing No. MSEC719-01, in Appendix B.

The following sections provide comparisons between the observed and predicted subsidence movements for the monitoring lines which were measured during and after the extraction of Longwall A7. The predicted movements are based on the predicted subsidence contours provided in Report No. MSEC650 (Rev. A), which includes the modified commencing and finishing ends of Longwall A7.

The predicted incremental conventional subsidence contours, resulting from the extraction of Longwall A7, have been reproduced in Drawing No. MSEC719-05, in Appendix B. The predicted subsidence contours are based on extracting 3.0 metres of bottom coal and achieving an 85 % recovery of the top coal. It is noted, that the as-extracted seam thickness (bottom plus top coal) is around 10 % less than that assumed for the subsidence predictions.

2.2. Line A7

Line A7 is a longitudinal monitoring line which follows the centreline of Longwall A7. The monitoring line was measured five times during and one time after the extraction of Longwall A7. The latest survey was carried out on the 17th June 2014, around two months after the completion of the longwall. The base survey was carried out on the 25th May 2013, around three weeks prior to the commencement of Longwall A7.

The observed profiles of incremental subsidence, tilt and strain along Line A7, resulting from the extraction of Longwall A7, are shown in Fig. A.01, in Appendix A. The predicted profiles of incremental subsidence and tilt along this monitoring line, after the completion of the longwall, are also shown in this figure for comparison.

A summary of the maximum observed and maximum predicted incremental subsidence parameters along Line A7, resulting from the extraction of Longwall A7, is provided in Table 2.1. The observed values are the maxima at any time during or after the completion of Longwall A7.

Table 2.1 Maximum Observed and Predicted Incremental Subsidence Parameters along Line A7 Resulting from the Extraction of Longwall A7

Type	Maximum Total Subsidence (mm)	Maximum Total Tilt (mm/m)	Maximum Total Tensile Strain (mm/m)	Maximum Total Comp. Strain (mm/m)
Observed	232	1.3	0.6	0.8
Predicted	450	2.5	*- Refer to discussions below -*	

The maximum observed incremental subsidence along Line A7 was 232 mm, which represents 52 % of the maximum predicted subsidence of 450 mm. Similarly, the maximum observed tilt of 1.3 mm/m represented 52 % of the maximum predicted tilt.

The observed subsidence and tilt profiles were reasonably symmetrical, but the subsidence profile was slightly flatter (i.e. lower tilt) at the longwall finishing end (i.e. left side of Fig. A.01). A localised bump (i.e. uplift) developed in the subsidence profile at Mark A733, however, it was not associated with any elevated strains and was not considered anomalous.

The maximum observed incremental strains along Line A7 were 0.6 mm/m tensile and 0.8 mm/m compressive. The maximum predicted conventional strains, based on applying a factor of 15 to the maximum predicted conventional curvatures anywhere above Longwall A7, are 0.6 mm/m tensile and 0.9 mm/m compressive.

The maximum observed strains occurred in adjacent survey bays (i.e. as a tensile-compressive pair) and were located outside of the extents of the longwall and, therefore, could be the result of a disturbed survey mark. Elsewhere, the observed strains were typically in the order of survey tolerance (i.e. 0.3 mm/m), with localised strains up to 0.5 mm/m tensile and compressive.

There were no irregular (i.e. anomalous) strains identified along Line A7.

2.3. Line XL3

Line XL3 is a cross-line located between the middle and commencing end Longwall A7. The monitoring line was measured five times during and one time after the extraction of Longwall A7. The latest survey was carried out on the 16th June 2014, around two months after the completion of the longwall. The base survey was carried out on the 4th June 2013, which was 10 days prior to the commencement of Longwall A7

The observed profiles of incremental subsidence, tilt and strain along Line XL3, resulting from the extraction of Longwall A7, are shown in Fig. A.02, in Appendix A. The predicted profiles of incremental subsidence and tilt along this monitoring line, at the completion of Longwall A7, are also shown in this figure for comparison.

A summary of the maximum observed and maximum predicted incremental subsidence parameters along Line XL3, resulting from the extraction of Longwall A7, are provided in Table 2.2. The observed values are the maxima at any time during or after the completion of Longwall A7.

Table 2.2 Maximum Observed and Predicted Incremental Subsidence Parameters along Line XL3 Resulting from the Extraction of Longwall A7

Type	Maximum Total Subsidence (mm)	Maximum Total Tilt (mm/m)	Maximum Total Tensile Strain (mm/m)	Maximum Total Comp. Strain (mm/m)
Observed	232	1.5	0.9	0.8
Predicted	450	1.5	*- Refer to discussions below -*	

The maximum observed incremental subsidence along Line XL3 was 232 mm, which represents 52 % of the maximum predicted subsidence of 450 mm (as per Line A7). The shape of the observed subsidence profile reasonably matched the predicted subsidence profile, but with a reduced magnitude. There is a slight lateral shift in the observed subsidence profile, towards the longwall maingate (i.e. right side in Fig. A.02), which could be the result of the natural surface slope.

The maximum observed incremental tilt was 1.5 mm/m which was the same as the maximum predicted tilt. The observed tilt profile also reasonably matched the predicted tilt profile. The observed tilt locally exceeded the predicted tilt between Marks XL326 and XL327, due to the localised bump (i.e. uplift) in the subsidence profile at Mark XL326. The localised bump was not associated with any elevated strains and, therefore, was not considered anomalous.

The maximum observed incremental strains were 0.9 mm/m tensile and 0.8 mm/m compressive. The maximum predicted conventional strains, based on applying a factor of 15 to the maximum predicted conventional curvatures anywhere above Longwall A7, are 0.6 mm/m tensile and 0.9 mm/m compressive

The maximum observed tensile strain occurs between Marks XL339 and XL340, which were located at the top of the hill and, therefore, this localised strain could have been influenced by the surface topography. The maximum observed compressive strain occurs between Marks XL328 and XL329, which were located directly above the longwall, and was less than the maxima predicted due to conventional movements.

There was a tensile-compressive strain pair (both 0.7 mm/m) located between Marks XL311 to XL313, which were located well outside the longwall and, therefore, could be the result of a disturbed survey mark. Elsewhere, the observed strains were typically in the order of survey tolerance, with some localised strains up to around 0.5 mm/m.

There were no non-conventional (i.e. anomalous) strains identified along the Line XL3.

2.4. Quorrobolong Road

The Quorrobolong Road monitoring line follows the alignment of Quorrobolong Road which crosses the north-western corner Longwall A7. The monitoring line was measured five times during and three times after the extraction of Longwall A7. The latest survey was carried out on the 20th May 2014, around one month after the completion of the longwall. The base survey was carried out on the 28th January 2014, when the longwall chainage was 230 metres and the extraction face was around 100 metres from the road.

The observed profiles of incremental subsidence, tilt and strain along the Quorrobolong Road Line, resulting from the extraction of Longwall A7, are shown in Fig. A.03, in Appendix A. The predicted profiles of incremental subsidence and tilt along this monitoring line, at the completion of Longwall A7, are also shown in this figure for comparison.

A summary of the maximum observed and maximum predicted incremental subsidence parameters along the Quorrobolong Road Line, resulting from the extraction of Longwall A7, are provided in Table 2.3. The observed values are the maxima at any time during or after the completion of Longwall A7.

Table 2.3 Maximum Observed and Predicted Incremental Subsidence Parameters along the Quorrobolong Road Line Resulting from the Extraction of Longwall A7

Type	Maximum Total Subsidence (mm)	Maximum Total Tilt (mm/m)	Maximum Total Tensile Strain (mm/m)	Maximum Total Comp. Strain (mm/m)
Observed	66	1.9	4.0	3.0
Predicted	150	0.7	*- Refer to discussions below -*	

The maximum observed incremental subsidence along the Quorrobolong Road Line was 66 mm, which is less than half of the maximum predicted subsidence of 150 mm. Only low level subsidence developed along this monitoring line as it crosses the corner of the longwall.

It can be seen from Fig. A.03, that the profiles of observed tilt and strain were very irregular. The localised tilts and strains along the monitoring line exceed those predicted based on conventional movements and are greater than those which would be expected based on the low level of vertical subsidence.

The survey marks have been established in the verge adjacent to Quorrobolong Road and, therefore, it is likely that these localised tilts and strains were the result of disturbed survey marks. This is supported by the fact that the visual monitoring did not identify any visual impacts in road pavement as a result of mining.

It is expected, based on the low levels of vertical subsidence, that the actual tilts and strains (i.e. excluding the disturbed marks) would be in the order of survey tolerance.

2.5. Summary

The ground movements measured along Lines A7 and XL3 indicate that the observed subsidence and tilt, resulting from the extraction of Longwall A7, were generally similar to or less than the maxima predicted. The profiles of observed subsidence and tilt also reasonably matched those predicted, but with reduced magnitudes.

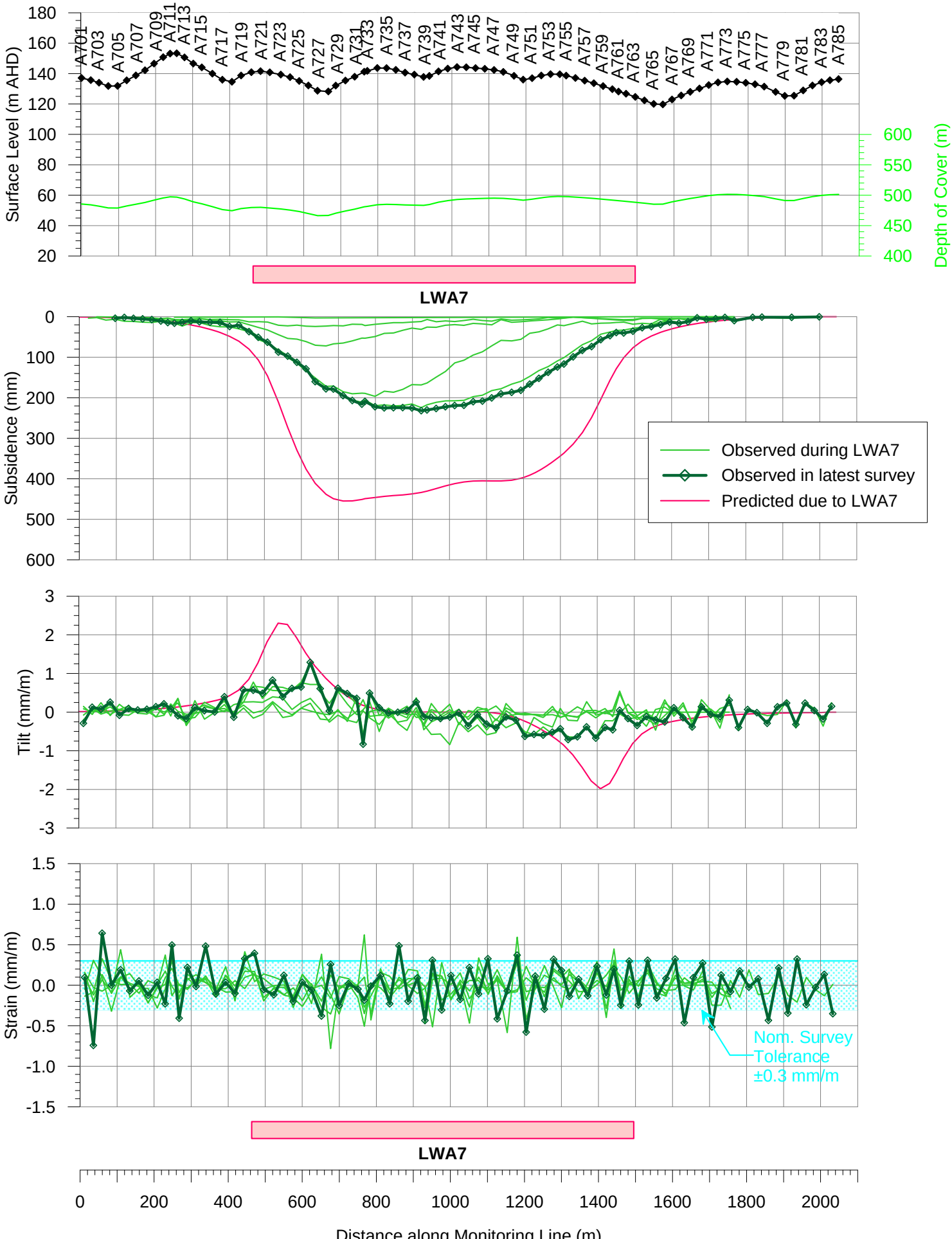
Only low level subsidence was measured along the Quorrobolong Road Line as this monitoring line crosses the corner of the longwall. The observed tilt and strain profiles along this monitoring line were very irregular and the localised movements appear to be the result of disturbed survey marks.

The observed strains along Lines A7 and XL3 were typically less than the predicted conventional strains. The maximum observed tensile strain along the XL3 Line, of 0.9 mm/m, occurred at the top of a hill and could have been influenced by the surface topography. Tensile-compressive strain pairs also occurred along each of the Lines A7 and XL3, at locations outside of the longwall and, therefore, could have resulted from disturbed survey marks. Otherwise, the strains were similar to the order of survey tolerance.

It has been considered, therefore, that the Incremental Profile Method has provided adequate predictions of the mine subsidence movements for Austar Stage 3 Longwall A7. It has also been considered that it is not necessary to undertake any further calibration of the prediction model, based on the monitoring data, or to update the impact assessments which have been provided in Reports Nos. MSEC309, MSEC484 and MSEC650.

APPENDIX A. FIGURES

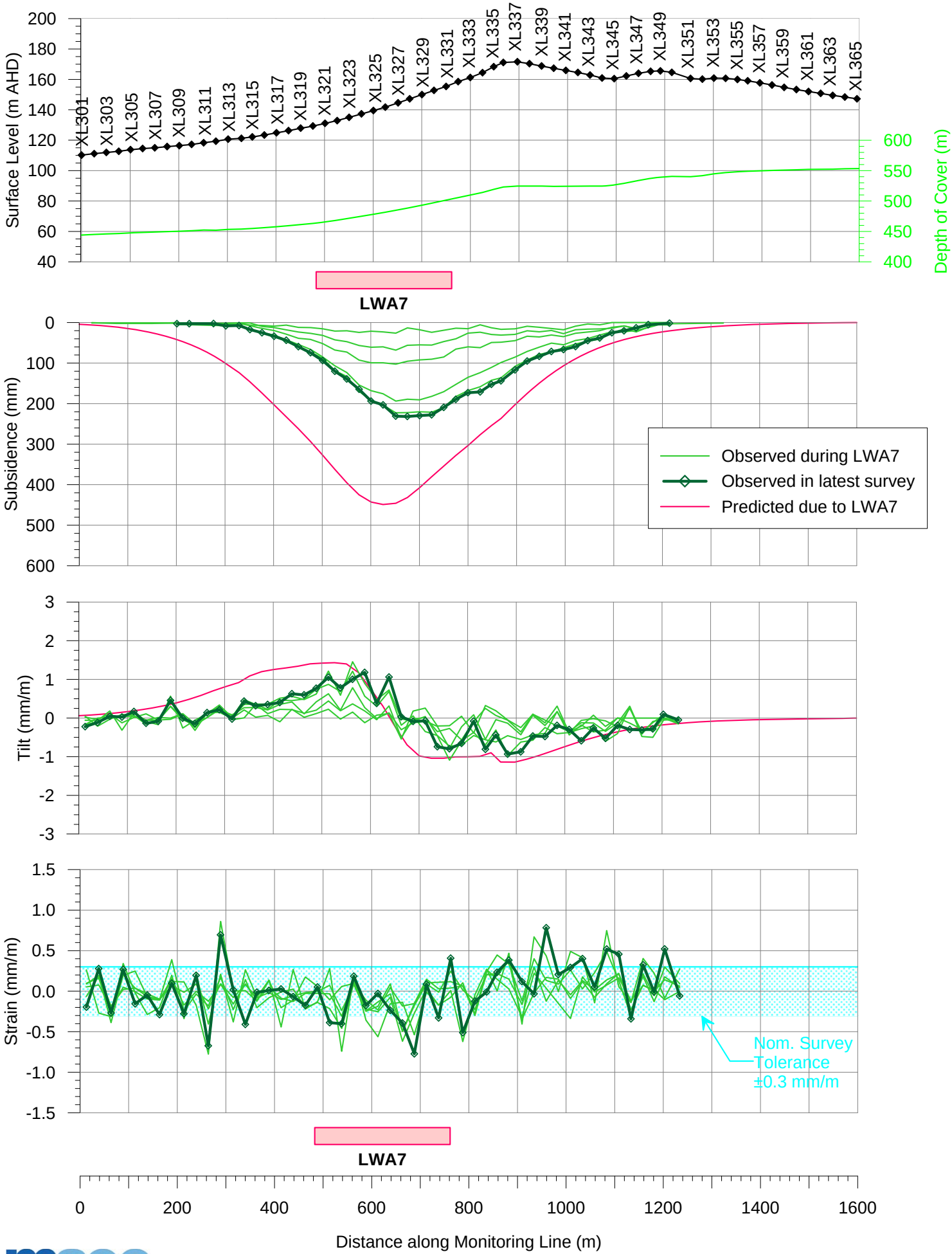
Observed and Predicted Profiles of Incremental Subsidence, Tilt and Strain along the A7-Line during Austar Stage 3 LWA7



msec

Fig. A.01

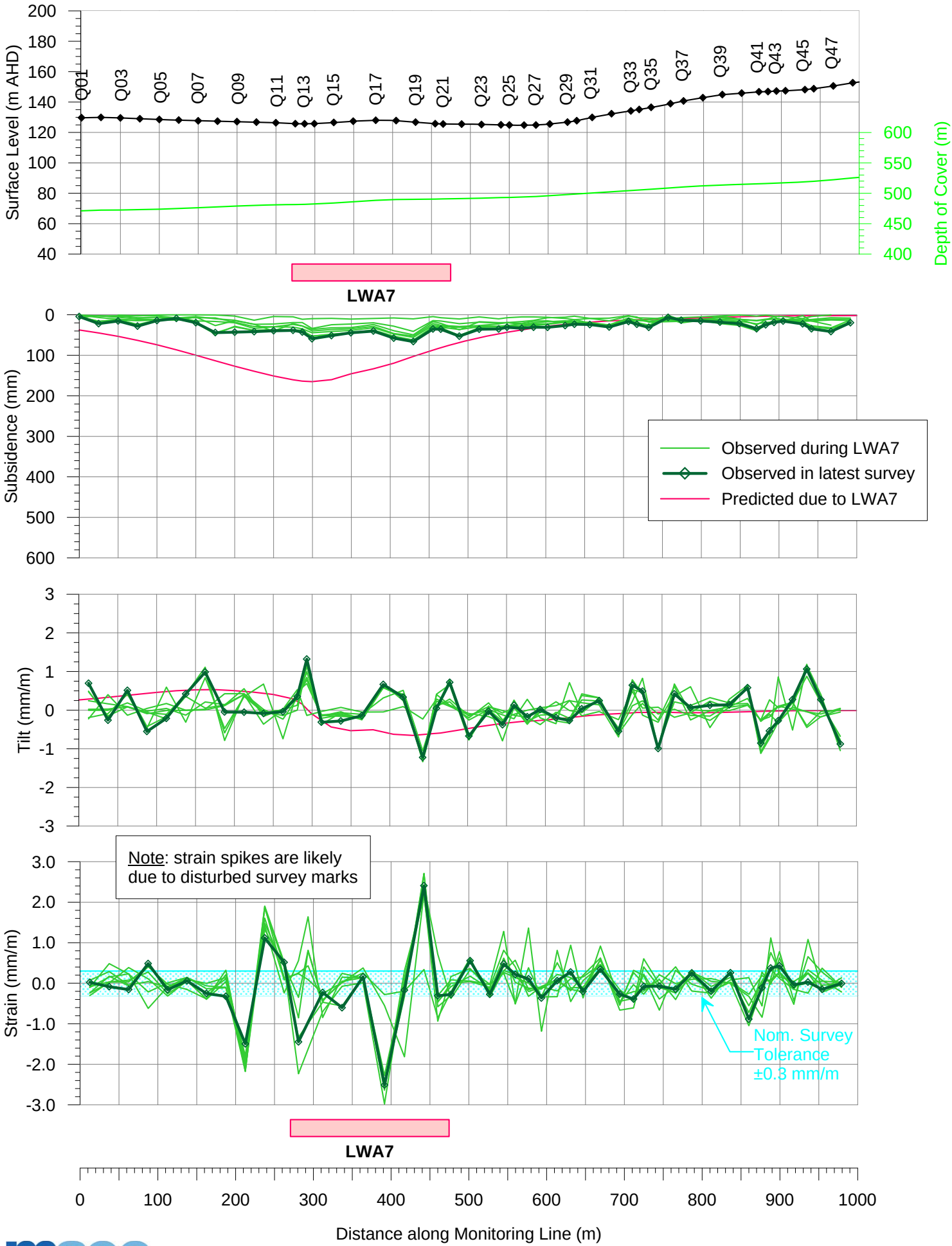
Observed and Predicted Profiles of Incremental Subsidence, Tilt and Strain along the XL3-Line during Austar Stage 3 LWA7



msec

Fig. A.02

Observed and Predicted Profiles of Incremental Subsidence, Tilt and Strain along Quorrobolong Road during Austar Stage 3 LWA7



msec

Fig. A.03

APPENDIX B. DRAWINGS

I:\Projects\Austar\Stage 3\MSEC719 - LWA7 End of Panel Report\AcadData\MSEC719-01.dwg

msec mine subsidence ENGINEERING CONSULTANTS
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www.minesubsidence.com

AUSTAR COAL MINE

STAGE 3 MODIFICATION
LONGWALL A7 END OF PANEL
GENERAL LAYOUT

DATE:	SCALE:	DRAWING No:	Rev No
19-Aug-2014	1:12500	MSEC719-01	A

Aberdare Central

6 360 000

6 359 000

347 000

348 000

349 000

LEGEND

EXISTING MONITORING LINES

LINE XL3

LINE A7

QUORROBOLONG RD

START LWA7
14-JUN-2013

FINISH LWA7
19-APR-2014

LW A7

LW A8

LW A9

LW A10

LW A11

Grid to MGA co-ordinates

I:\Projects\Austar\Stage 3\MSEC719 - LWA7 End of Panel Report\AcadData\MSEC719-02.dwg

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AUSTAR COAL MINE

STAGE 3 MODIFICATION
LONGWALL A7 END OF PANEL
SURFACE LEVEL CONTOURS

DATE:	SCALE:	DRAWING No:	Rev No
19-Aug-2014	1:12500	MSEC719-02	A

SURFACE LEVEL CONTOURS ARE IN m AHD

Grid to MGA co-ordinates

6 360 000
6 359 000
347 000
348 000
349 000

LW A7
LW A8
LW A9
LW A10
LW A11

I:\Projects\Austar\Stage 3\MSEC719 - LWA7 End of Panel Report\AcadData\MSEC719-03.dwg

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AUSTAR COAL MINE

STAGE 3 MODIFICATION
LONGWALL A7 END OF PANEL
DEPTH OF COVER CONTOURS

DATE:	SCALE:	DRAWING No:	Rev No
19-Aug-2014	1:12500	MSEC719-03	A

DEPTH OF COVER CONTOURS ARE IN METRES

6 360 000
6 359 000
347 000
348 000
349 000

LW A7
LW A8
LW A9
LW A10
LW A11

Abernethy Fault Zone
Quorrobolong Fault Zone

Grid to MGA co-ordinates

I:\Projects\Austar\Stage 3\MSEC719 - LWA7 End of Panel Report\AcadData\MSEC719-04.dwg

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AUSTAR COAL MINE

STAGE 3 MODIFICATION
LONGWALL A7 END OF PANEL
SEAM THICKNESS CONTOURS

DATE:	SCALE:	DRAWING No:	Rev No
19-Aug-2014	1:12500	MSEC719-04	A

SEAM THICKNESS CONTOURS ARE IN METRES

6 360 000
6 359 000
347 000
348 000
349 000

LW A7
LW A8
LW A9
LW A10
LW A11

6.5
6.5
0.7
0.9

Abernethy Fault Zone
Quorrobolong Fault Zone
10m

Grid to MGA co-ordinates

I:\Projects\Austar\Stage 3\MSEC719 - LWA7 End of Panel Report\AcadData\MSEC719-05.dwg

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AUSTAR COAL MINE

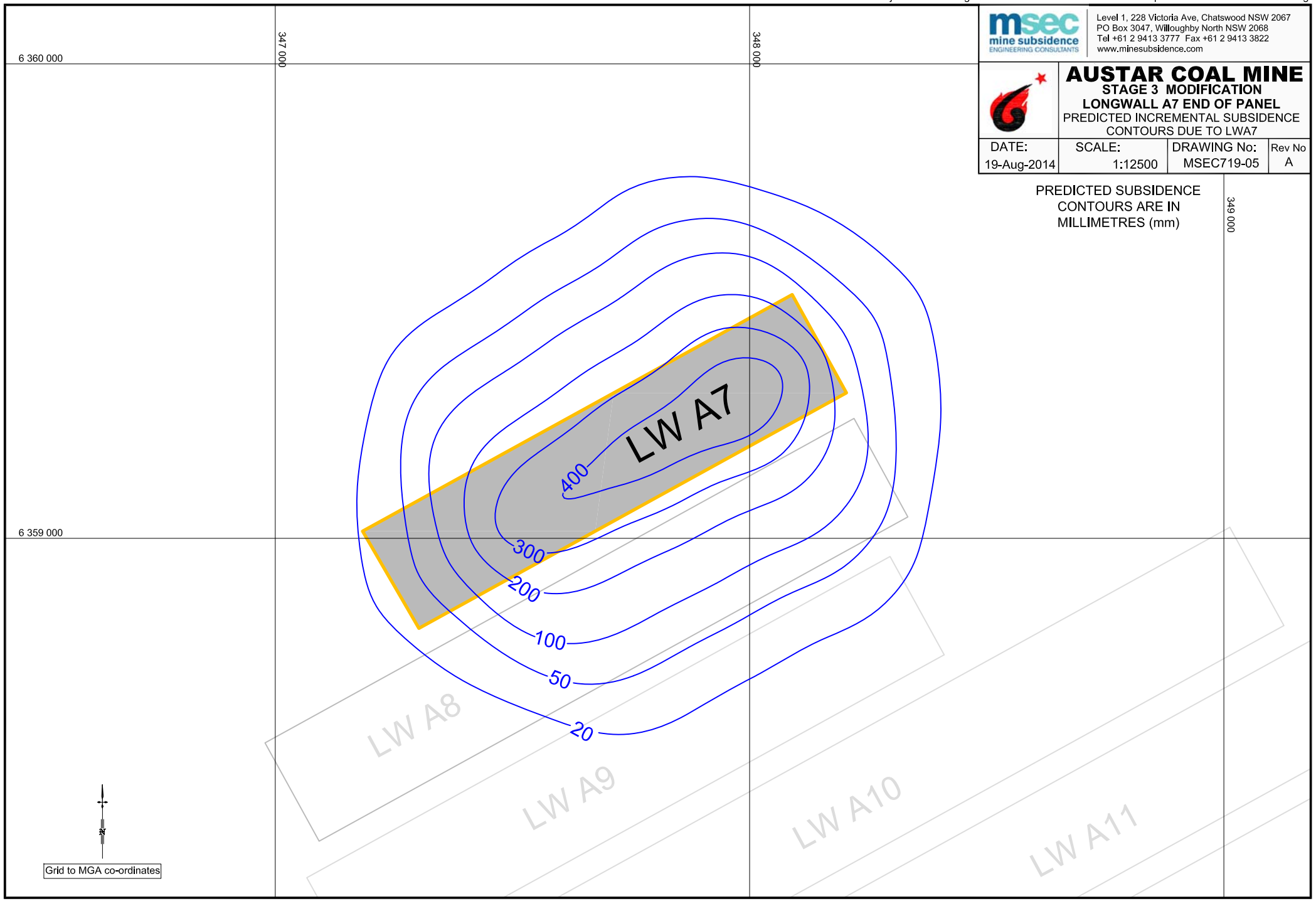
STAGE 3 MODIFICATION

LONGWALL A7 END OF PANEL

PREDICTED INCREMENTAL SUBSIDENCE CONTOURS DUE TO LWA7

DATE:	SCALE:	DRAWING No:	Rev No
19-Aug-2014	1:12500	MSEC719-05	A

PREDICTED SUBSIDENCE CONTOURS ARE IN MILLIMETRES (mm)



Appendix F:

Community Complaints

Austar Coal Mine Community Complaints Register
July 2013 - June 2014

Complaint No	Category	Date	Property	Detail	Follow Up Actions
1	Noise	3/09/2013	Moon Mountain Drive, Mount View	Resident called regarding CHPP dozer noise on 1/9/13 0200-0400, 2/9/13 0200-0400, 3/9/13 0130-0400. Resident has had trouble sleeping due to the noise. Dozer noise is worse when reversing.	Upon investigation it was identified that a couple of the operators were operating the dozers outside site procedures. This was addressed with all operators reminded of the procedure for operation of the dozers. Track maintenance was also investigated. The dozers are serviced a minimum of once per week with track tension checked weekly. After investigation was completed Environment & Community Manager (ECM) contacted the complainant to advise of outcomes of the investigation.
2	Noise	4/09/2013	1.5km northwest of CHPP site	Complaint received through EPA Environment Line. Caller reports intense noise during the night such that they could not sleep at all. It began at 2am & didn't stop until 4am. It started again at 8am. Caller is approximately 1.5k from the site in a north westerly direction. The noise is from their huge bulldozer; it is OK when going forwards but in reverse, the dozer "tracks" are loose & make an incredible noise as they slap together. Caller states that the machine needs service & repairs & that this noise level & intrusion is avoidable. Caller relates that this noise has been getting worse over the past few months.	ECM contacted EPA officer to discuss details of complaint on 10/9/13. ECM responded with an email detailing investigation of operation of the dozers, with some drivers operating in 2nd gear, which is not in accordance with site imposed operational noise control procedure, dozers are to operate in 1st gear only. Track maintenance was also investigated. The dozers are serviced a minimum of once per week with track tension checked weekly.

Austar Coal Mine Community Complaints Register
July 2013 - June 2014

Complaint No	Category	Date	Property	Detail	Follow Up Actions
3	Noise	24/09/2013	East of Ellalong village	Complaint received through EPA Environment Line. From EPA "Loud intrusive noise again. Bad for the past eight months; but louder over the last three months - noise seems to be clunking for about 20 hours a day. Caller lives 5kms away but the noise from the mine is so loud it sounds like it's in the caller's bedroom. Caller aware mine has to keep noise down to 34db(A) but this isn't happening. More intrusive at night due to the lower background noise level of 24dB(A). The caller believes the noise is from the "Pelton Pit at Ellalong".	ECM contacted EPA officer to discuss details of the complaint, and advise of investigations that are planned. ECM arranged complaint response monitoring to occur on 25/9/13, also arranged for Conveyor Maintenance Engineer to investigate surface coal bin, which appears to be a source of noise at the Pit Top. Results of monitoring indicate compliance with what would be the most stringent noise limits (LAeq 35 dB), but there are no noise limits for the Pit Top.

Austar Coal Mine Community Complaints Register
July 2013 - June 2014

Complaint No	Category	Date	Property	Detail	Follow Up Actions
4	Noise	4/11/2013	West of Ellalong village	EPA advised they received 4 noise complaints dated 17/10-3/11/2013. The caller believes the noise is from the "Pelton or Paxton area". The complainant described a "mechanical noise like chains banging" and noted "it's like living next to a blacksmiths shop". EPA requested Austar investigate the complaints and advise of the outcome as this appears to be an ongoing issue. In particular, consider operations/equipment that was operating at the time of the most recent complaint on 3/11/13.	An investigation into the Pit Top area noise sources was conducted in relation to these complaints and it was considered that the noise that is subject of the complaint may be due to Austar's surface coal bin. Coal from the drift conveyor strikes a wear plate at the top of the bin, and it was considered that this could be the source of the noise. In response to these findings, Austar's conveyor engineers developed a trial amendment to the wear plate in an effort to reduce impact noise on the wear plate. The amendment included installation of hard wearing rubber lining onto the wear plate. Noise performance was very good, and Austar are monitoring the performance of the trial lining for longevity. ECM responded to EPA with details of the investigation and actions undertaken.
5	Noise	25/05/2014	Pelton Rd, Quorrobolong	Resident left message on ECM's phone. Indicated the Kitchener SIS had been noisy lately.	Night noise monitoring was undertaken on the night of 26/5/14. Nil noise exceedances were recorded. ECM attempted to contact the complainant on numerous occasions, but the mobile was switched off or not in a mobile service area.

Austar Coal Mine Community Complaints Register
July 2013 - June 2014

Complaint No	Category	Date	Property	Detail	Follow Up Actions
6	Noise	04/06/2014	Ellalong	Complaint received through EPA Environment Line. EPA officer called Austar ECM to advise of complaint from a resident in Ellalong which identified noise source approx. 1km to northeast of callers house. The complainant suggested something different was occurring at the mine since mid April. The caller identified the noise as distinct and obvious and of a "wooo, wooo, wooo" nature. ECM discussed location based on description is either Kalingo Dam (where there is a pump station), or No. 3 shaft (where there are ventilation fans, and a compressor compound). ECM advised the noise limits in that area, and that results of recent monthly night monitoring on 26/5/14 complied with noise limits. ECM offered that the complainant could call site directly to discuss.	ECM visited Kalingo Dam and No. 3 shaft on 5/6/14. No new activities were identified. Nil further action required.

Austar Coal Mine Community Complaints Register
July 2013 - June 2014

Complaint No	Category	Date	Property	Detail	Follow Up Actions
7	Noise	26/06/2014	Ellalong	Complaint received through EPA Environment Line. EPA emailed details as follows: "The complaint was received at 4am Tuesday 17 June 2014, but as noted they were also affected on several other dates. Complainant lives in Ellalong. Incident Address: Austar Mine at Paxton: noise from the Hunter St site at Ellalong Also: exhaust fans at the old Kalingo mine workings ELLALONG NSW 2325 Description of Incident: Loud low hum; caller thinks the plant must be switched on and off because this particular noise seems to start and stop quite suddenly. Very loud Wed and Thur last week; woke caller at 3am each day. Caller usually goes back to sleep after 30-60 minutes. Noise also woke caller on Fri at 4am and kept awake until 6am. Today noise woke caller at 4am and noise was still audible at 7am. Noise not audible at the moment. Also loud noise from the exhaust fans at the front: are currently over the 36dB(A) and have been for some time. This is at the old Kalingo mine workings. This noise has been a problem for the last 15 years but is worse since the accident."	Environment & Community Coordinator (ECC) conducted an investigation into operations at the Pittop, No.1 Shaft and Kalingo Infrastructure Area for the times listed by the complainant. Operations were found be unchanged at Kalingo Infrastructure Area over the past few months, and to be very limited at No.1 Shaft and the Pittop area during the times described. Noise monitoring in accordance with Austar's Noise and Vibration Management Plan was conducted by Austar's noise consultants during the night of Wednesday 25 June. No exceedances to noise limits were recorded. EPA officer advised no further action required at the present time.

Appendix G:

Environmental Incidents

Austar Coal Mine 2013-2014 Environmental Incidents

Incident No.	Date	Incident Details	Follow Up Actions
1	19/08/2013	During routine inspection by the Surface Coordinator, seepage from the Pit Top treated effluent dam wall was noted and reported to Environment Department. Risk of discharge to clean water system was identified if seepage were to increase.	As a result of this incident the following actions were undertaken: • Additional bund wall established to ensure any potential seepage is directed to Austar's dirty water system; • The dam level was pumped down to reduce pressure; • Austar engaged a geotechnical review of the effluent dam; and • Trees and vegetation on the dam wall was removed to remove risk of tree roots creating a seepage path.
2	04/09/2013	During routine monthly maintenance by Separator Maintenance, corrosion was identified within the oil/water separator causing water to pass through small holes in last weir plate. This has potential for level in oil/water separator to drop if no inflow. Oil/water separator outlet water flows to Austar Dam via an open drain within the dirty water system. Water is sent from Austar Dam to the CHPP for treatment.	As a result of this incident the following actions were undertaken: • Containment: Install oil skimmer booms, ensure water level in separator is maintained at normal operating level, monitoring of containment measures. • Countermeasure: Installation of replacement Oil / Water separator was undertaken.
3	26/09/2013	Routine quarterly noise compliance monitoring during the night of 25 September 2013 recorded measured noise levels at location NMC3 (O'Hearn residence) right at the noise limit (LA90, 15 minute 37dB). A review of meteorological conditions indicated that moderate inversion conditions were present at the time of monitoring, which may have caused some enhancement of noise levels. The nature of noise classified as low frequency in accordance with the INP methods, resulting in a 5 dB modifying factor applying to the measured noise level. The assessable noise level therefore exceeded the EPL noise limit by 5 dB at the O'Hearn Residence. No atypical site activities were being undertaken at this time.	As a result of this incident the following actions were undertaken: • The resident was informed of the measured exceedance. • The EPA & DP&I were notified. • An incident report was provided to the EPA and DP&I with results of monitoring and details of Austar's continued participation in a voluntary Noise Pollution Reduction Program in consultation with the EPA and will continue to monitor

Austar Coal Mine 2013-2014 Environmental Incidents

Incident No.	Date	Incident Details	Follow Up Actions
4	11/10/2013	During routine pipeline inspection a leak was identified in the 2 shaft pipeline as a wet spot on the ground along the pipeline route.	As a result of this incident the following actions were undertaken: • The 2 shaft pump was immediately turned off and isolated; and • Repairs were conducted on the pipeline in the following days to stop the leak.
5	17/10/2013	Routine quarterly noise compliance monitoring measured noise levels from both the CHPP and Kitchener SIS at less than the relevant noise limits before modifying factors were applied. The nature of the noise was classified as low frequency in accordance with the INP methods, but did not classify as low frequency in accordance with the Broner method. With the INP low frequency noise modifying factor applied to measured noise levels, an exceedance of noise limits was assessed at the Pyne Residence (NMC1) and O'Hearn Residence (NMC3) surrounding the CHPP, and at the Seradilla Residence (NMK1) adjacent to Kitchener SIS on 16 October 2013. Conversely, if the Broner method is used to assess if low frequency noise is present, there is no exceedance on the night of monitoring. Austar's NVMP specifies that low frequency noise will be assessed in accordance with both methods. No atypical operations were being undertaken at the time of monitoring.	As a result of this incident the following actions were undertaken: • EPA and DP&I notified on noise results. • Follow-up monitoring was conducted on the 22nd October 2013 at the locations of exceedances, results recorded under the same operating conditions complied with noise limits. EPA & DP&I notified.

Austar Coal Mine 2013-2014 Environmental Incidents

Incident No.	Date	Incident Details	Follow Up Actions
6	18/11/2013	During a period of heavy rainfall from 15 November to 18 November 2013 during which a total of 158mm was recorded, the design capacity of the eastern sediment basin at the Kitchener SIS was exceeded which caused discharge over the outlet weir into Black Creek to occur. The sediment basin performed as designed and approved in the Shaft Construction Environmental Management Plan. The sediment basin design size is based on a catchment area of 3.7 Ha (being the cleared area on the eastern side) and Type D soils for a 90th percentile five day rainfall depth of 42.8mm. The sediment dam has a volume of approximately 1.6ML.	As a result of this incident the following actions were undertaken:- • The incident was immediately reported to the EPA Environment Line; • Water samples were collected on 18 November 2013 and result provided to the EPA with a written incident report; • Pumping of water from the eastern sediment basin to the water storage dams occurred as soon as sufficient runoff had collected in the basin, and continued until the eastern basin was empty; and • Pumping of water from the water storage dams to Kalingo Dam occurred as soon as sufficient water had collected, to reduce accumulated stormwater pumped to these dams in readiness for future rainfall events.
7	21/05/2014	The incident involved spillage of coal stow material to land from the OL3 conveyor. The stow material contained a high water content and ran off belt on an incline leading up to Middle Road. The spill occurred during a period when only coal stow was loaded to the conveyor, and normal coal flow was not occurring. The spill was observed by CHPP personnel during an inspection and was confined to land.	As a result of this incident the following actions were undertaken: • The belt was turned off; • A containment bund was constructed and the spill was cleaned up; and • Internal management process for loading wet stow material to conveyors in the absence of normal coal flow was developed between mine to CHPP control.
8	04/06/2014	A leak was identified in the pipeline from the oil / water separator in the 3 Shaft compressor compound to the environmental dam in the fan compound. The discharged water could potentially have contained hydrocarbons. The leak was caused by vandalism to the pipeline with an axe.	As a result of this incident the following actions were undertaken: • The pump was turned off and isolated; • Pipeline repaired and tested to ensure no further leaks; • A small area of potentially contaminated material was excavated and removed to the hydrocarbon remediation area at the CHPP; • Topsoil was imported to site and spread over excavated area; • A sediment fence was installed downslope of the disturbed area.