LW102

END OF PANEL REPORT

NARRABRI MINE

Comments	Author	Authorised By	Date
LW102 End of Panel Report	S Farrar	O Salisbury	May 2014

Contents

Tables

Figures

Photos

Attachments

Appendices

1. INTRODUCTION

Narrabri Mine received Subsidence Management Plan (SMP) approval (10/9000) for Longwall Panels 101 to 105 in April 2012. The SMP was developed as part of the Extraction Plan for Longwall Panels (LW) 101 to 105 at the Narrabri Mine. The Extraction Plan, approved on 27 March 2012, is required by the Department of Planning and Infrastructure's (DP&I) consent (08_0144). This end of panel report has been prepared to satisfy the SMP approval, specifically Condition 18, for the second Longwall Panel completed at the Narrabri Mine, known as LW102. The specific requirements of Condition 18 are outlined in Table 1.

Table 1: SMP 10/9000 Approval Conditions

SMP Approval Condition	Section Addressed
18. Within 4 months of the completion of each longwall panel, an end of panel report must be submitted to the Director General. The end of panel report must:	This entire document
(a) include a summary of the subsidence and environmental monitoring results for the applicable longwall panel;	Section 3
(b) include an analysis of these monitoring results against the relevant: • impact assessment criteria; • monitoring results from previous panels; and • predictions in the SMP and EA;	Section 4
(c) identify any trends in the monitoring results over the life of the activity; and	Section 5
(d) describe what actions were taken to ensure adequate management of any potential subsidence impacts due to longwall mining.	Section 4

2. BACKGROUND

The second Longwall Panel (LW102) at Narrabri Mine was mined over a period of 6 months, from first coal to completion of the panel. Extraction of LW102 commenced in July 2013 and was completed in January 2014. Table 2 provides a summary of the LW102 parameters.

Table 2: Longwall 102 Mining Parameters

LW101	Parameters
Target Seam	Hoskissons Seam
Seam Thickness	6.0m to 11.0m
Length	1,786m
Face Width	295.6m
Void	306.4m
Extraction Height	4.2m
Chain Pillar Width	30m
Cover Range	170m to 180m
Commenced	22 July 2013
Completed	20 January 2014
Coal Extracted	3.2 Million Tonnes

2.1 Impacts

The surface area affected by the extraction of LW102 comprises mine owned private land holdings used primarily for livestock grazing and cropping. The surface topography is flat to slightly undulating with slopes of 2˚ – 5˚ and topographic relief ranging from 274m AHD to 289m AHD. One ephemeral creek and its tributary, one public road (known as Greylands Road) and one 11kV electricity transmission line are directly impacted by the extraction of LW102. The mine site infrastructure, Kamilaroi Highway and Northern Branch Railway Line are >1.9km to the east of LW102 and are considered to be outside the limits of far-field displacement and strain as outlined in the Extraction Plan.

The Extraction Plan predicted low impacts to the surface features as a result of mining LW102. Water ponding was predicted to occur above LW102. Ponding did occur as predicted during March 2014 following the completion of LW102 but it was generally limited to within the banks of the ephemeral creek, refer to Section 4.2.1 for more details. Trees along Greylands Road and along the ephemeral creek were impacted by subsidence which was not predicted to occur, refer to Section 4.2.1 for more details.

3. SUBSIDENCE MONITORING RESULTS

Narrabri Mine has established a subsidence monitoring program, required as part of the Extraction Plan for Longwall Panels LW101 to LW105, to quantify subsidence parameters and to identify subsidence related impacts to environmental and built features. Subsidence monitoring results are reported to the Principal Subsidence Engineer at the Division of Resources and Energy (DRE). The subsidence monitoring program consists of the following elements and is presented as Attachment 1:

- A transverse subsidence line across longwall panels LW101 to LW105;
- A full-length longitudinal line over LW101 and LW102 with reduced monitoring extending over the starting and finishing point of each remaining longwall block (LW103 – LW105);
- A survey line along the riparian management zone of Pine Creek and Pine Creek Tributary No.1;
- Four additional survey cross lines perpendicular to Pine Creek Tributary No 1 to establish lateral movement impacts; and
- Survey markers on the 11kV power poles for monitoring of tilt and strain to poles over LW101 to LW104.

Aerial Laser Scanning (ALS) surveys have been conducted at Narrabri Mine as they are considered to provide a more thorough understanding of subsidence development and the intention is to phase out the longitudinal monitoring to be replaced with ALS surveys should it prove to be an adequate monitoring technique. To date, Narrabri Mine has completed four surveys: November 2008 (baseline), 31 December 2012, 25 July 2013 and 2 December 2013. The December 2013 image is included as Figure 1.

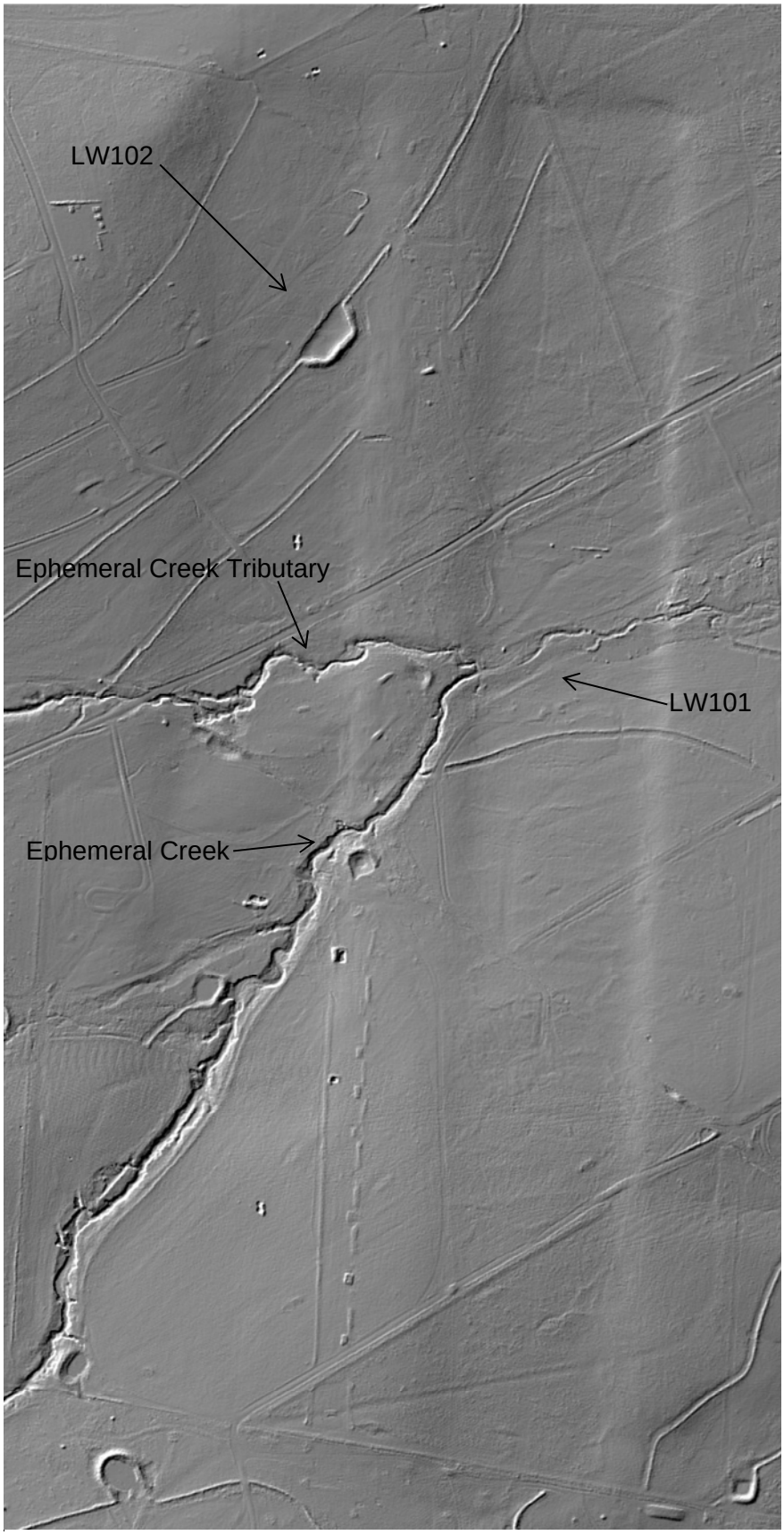


Figure 1: ALS Survey Image of LW101 & LW102, 2 December 2013

Table 3 outlines all of the longitudinal surveys undertaken up to 28 April 2014 at the Narrabri Mine.

Table 3: Subsidence Monitoring Lines

Monitoring Line	Panel	Installation Date	Survey Date(s)	Survey(s) Completed	Comments
101 –Centreline	101	April & May 2012	9/08/2012, 17/08/2012, 27/08/2012, 6/09/2012, 2/10/2012, 9/10/2012, 6/11/2012, 10/12/2012, 15/01/2013, 18/02/2013, 22/03/2013, 11/04/2013, 6/05/2013, 26/09/2013, 12/03/2014	15	All points surveyed
102 – Centreline	102	April & May 2012	31/07/2013, 6/08/2013, 9/08/2013, 19/08/2013, 22/08/2013, 26/08/2013, 25/09/2013, 24/10/2013, 19/11/2013, 31/12/2013, 21/01/2014, 4/03/2014	12	All points surveyed
103 North – Centreline	103	April & May 2012	11/03/2014, 17/03/2014, 24/03/2014, 31/03/2014, 8/04/2014	5	All points surveyed
103 South - Centreline	103	April & May 2012-	-	-	-
104 North – Centreline	104	-	-	-	-
104 South – Centreline	104	December 2013 & January 2014	-	-	-
105 North – Centreline	105	December 2013 & January 2014	-	-	-
105 South – Centreline	105	December 2013 & January 2014	-	-	-
A - Crossline	101 – 106	April & May 2012	13/11/2012, 3/12/2012, 14/12/2012, 7/02/2013, 21/2/2013, 13/08/2013, 19/09/2013, 1/10/2013, 23/10/2013, 31/10/2013, 6/11/2013, 28/04/2014	12	Surveyed to point 157 of 211
B – Pine Creek Tributary 1 (PC1)	101 – 103	April & May 2012	21/11/2012, 3/12/2012, 4/01/2013, 18/06/2013, 21/10/2013, 11/11/2013, 2/12/2013	7	All points surveyed
C – Dam Wall	103	REMOVED			
D – Pine Creek (PC)	104 & 105	December 2013 & January 2014	-	-	-
E – PC1 Crossline 1	101 & 102	April & May 2012	4/01/2013, 7/01/2013, 16/1/2013, 18/06/2013, 17/10/2013, 21/10/2013, 23/10/2013	7	All points surveyed

Monitoring Line	Panel	Installation Date	Survey Date(s)	Survey(s) Completed	Comments
F – PC1 Crossline 2	102	April & May 2012	11/02/2013, 21/02/2013, 25/02/2013, 18/06/2013, 31/10/2013, 6/11/2013, 11/11/2013	7	All points surveyed
G – PC1 Crossline 3	102 & 103	April & May 2012	18/06/2013, 25/11/2013, 2/12/2013, 4/12/2013	4	All points surveyed
Power Poles	101 – 105	19 & 21 March 2013	29/04/2013, 1/05/2013, 6/05/2013, 13/05/2013, 17/05/2013, 26/08/2013, 19/09/2013, 29/10/2013, 18/11/2013, 9/12/2013, 16/12/2013, 24/12/2014, 31/12/2014, 2/01/2014, 20/01/2014	15	Pole 2 to Pole 6

Table 4 compares the predicted subsidence parameters to all of the measured subsidence parameters for data available to 28 April 2014.

Table 4: Subsidence Parameters – Predicted and Observed

Longwall Panel 101		
	Maximum Predicted Extraction Plan	Maximum Measured
Line 101 – Centre of LW101		
Subsidence (m)	2.44	2.628
Tilt (mm/m)	47	29.1 – 46.3
Tensile Strain (mm/m)	11 – 22^	8.7 – 20.7
Compressive Strain (mm/m)	14 – 28^	7.5 – 26.6
Angle of Draw (°, Degrees)	22.5 – 26.5	20.2
Line 102 – Centre of LW102		
Subsidence (m)	2.44	2.665
Tilt (mm/m)	41	43.7
Tensile Strain (mm/m)	10 – 20^	20.5
Compressive Strain (mm/m)	12 – 24^	46.7
Angle of Draw (°, Degrees)	22.5 – 26.5	20.8
Line 103 – Centre of LW103 – Northern		
Subsidence (m)	2.44	2.589*
Tilt (mm/m)	35	40.2*
Tensile Strain (mm/m)	8 – 16^	18.8*
Compressive Strain (mm/m)	10 – 20^	16.2*
Angle of Draw (°, Degrees)	22.5 – 26.5	18.1*
Line A – Cross Panel Survey Line		
Subsidence (m)	2.44	2.573*
Tilt (mm/m)	47	56.3*
Tensile Strain (mm/m)	11 – 22^	17.1*

Longwall Panel 101		
	Maximum Predicted Extraction Plan	Maximum Measured
Compressive Strain (mm/m)	14 – 28^	26.7*
Angle of Draw (°, Degrees)	22.5 – 26.5	25.7*
Line B – Pine Creek Tributary 1		
Subsidence (m)	2.44	2.557*
Tilt (mm/m)	47	54.8*
Tensile Strain (mm/m)	11 – 22^	13.1*
Compressive Strain (mm/m)	14 – 28^	11.0*
Gradient Change (%)	Up to 6	5.47*
Line E – Pine Creek Tributary 1 Crossline 1		
Subsidence (m)	2.44	0.952*
Tilt (mm/m)	47	26.9*
Tensile Strain (mm/m)	11 – 22^	9.2*
Compressive Strain (mm/m)	14 – 28^	2.9*
Line F – Pine Creek Tributary 1 Crossline 2		
Subsidence (m)	2.44	2.514*
Tilt (mm/m)	41	53.5*
Tensile Strain (mm/m)	10 – 20^	6.6*
Compressive Strain (mm/m)	12 – 24^	11.9*
Line G – Pine Creek Tributary 1 Crossline 3		
Subsidence (m)	2.44	0.089*
Tilt (mm/m)	47	2.8*
Tensile Strain (mm/m)	11 – 22^	1.8*
Compressive Strain (mm/m)	14 – 28^	1.5*
Power Poles		
Pole 2		
Subsidence (m)	0	0.046
Dynamic Tilt (mm/m)	0	8.38
Final Tilt (mm/m)	0	7.21
Conductor length change between poles 2-3 (m)	0.13	0.56
Conductor Clearance Loss (m)	0.77	+0.20
Pole 3		
Subsidence (m)	2.18	2.085
Dynamic Tilt (mm/m)	30	66.3
Final Tilt (mm/m)	12	52.47
Conductor length change between poles 3 - 4 (m)	0.28	-0.81
Conductor Clearance Loss (m)	1.10	0.91

Longwall Panel 101		
	Maximum Predicted Extraction Plan	Maximum Measured
Pole 4		
Subsidence (m)	2.11	2.010
Dynamic Tilt (mm/m)	25	74.22
Final Tilt (mm/m)	15	43.49
Conductor length change between poles 4 - 5 (m)	0.13	0.48
Conductor Clearance Loss (m)	0.07	+0.21
Pole 5		
Subsidence (m)	0.31	0.047
Dynamic Tilt (mm/m)	2	16.32
Final Tilt (mm/m)	2	16.32
Conductor length change between poles 5 - 6 (m)	0.024	-0.12
Conductor Clearance Loss (m)	0.30	0.08
Pole 6		
Subsidence (m)	0.01	0.008
Dynamic Tilt (mm/m)	1	3.5
Final Tilt (mm/m)	1	1.65
Conductor length change between poles 6 - (m)	-	-
Conductor Clearance Loss (m)	-	-

* - subsidence development incomplete.

^ - values for ‘smooth’ and ‘discontinuous’ (i.e. crack affected) subsidence profiles.

Based on Table 4, several subsidence prediction exceedances have occurred above LW102 during the reporting period:

- The maximum subsidence measurements were within +/- 10% of the predicted value of 2.44 m with an average measured value of 2.501 m, refer to Figure 2.
- The maximum tilt measurements recorded for LW102 were within 10% of the predicted value of 41 mm/m, refer to Figure 3.
- The maximum tensile strain measurements for LW102 were within 10% of the predicted values of 10 mm/m (smooth profile) and 20 mm/m (discontinuous or crack affected profiles), refer to Figure 4.
- The maximum compressive strain measurements for LW102 exceeded the range of the predicted values of 12 mm/m (smooth profile) and 24 mm/m (discontinuous or crack affected profiles), refer to Figure 4. However, 98% of the recorded values were within the predicted range.

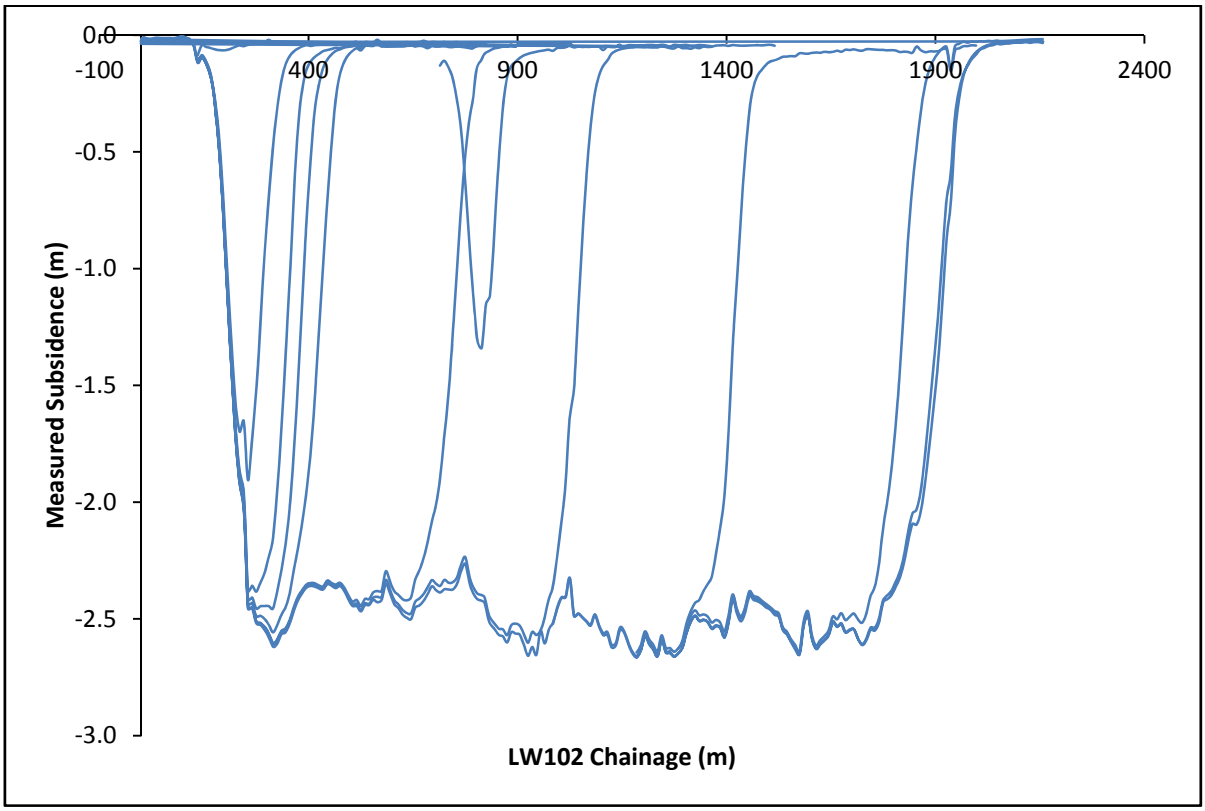


Figure 2: LW102 Subsidence

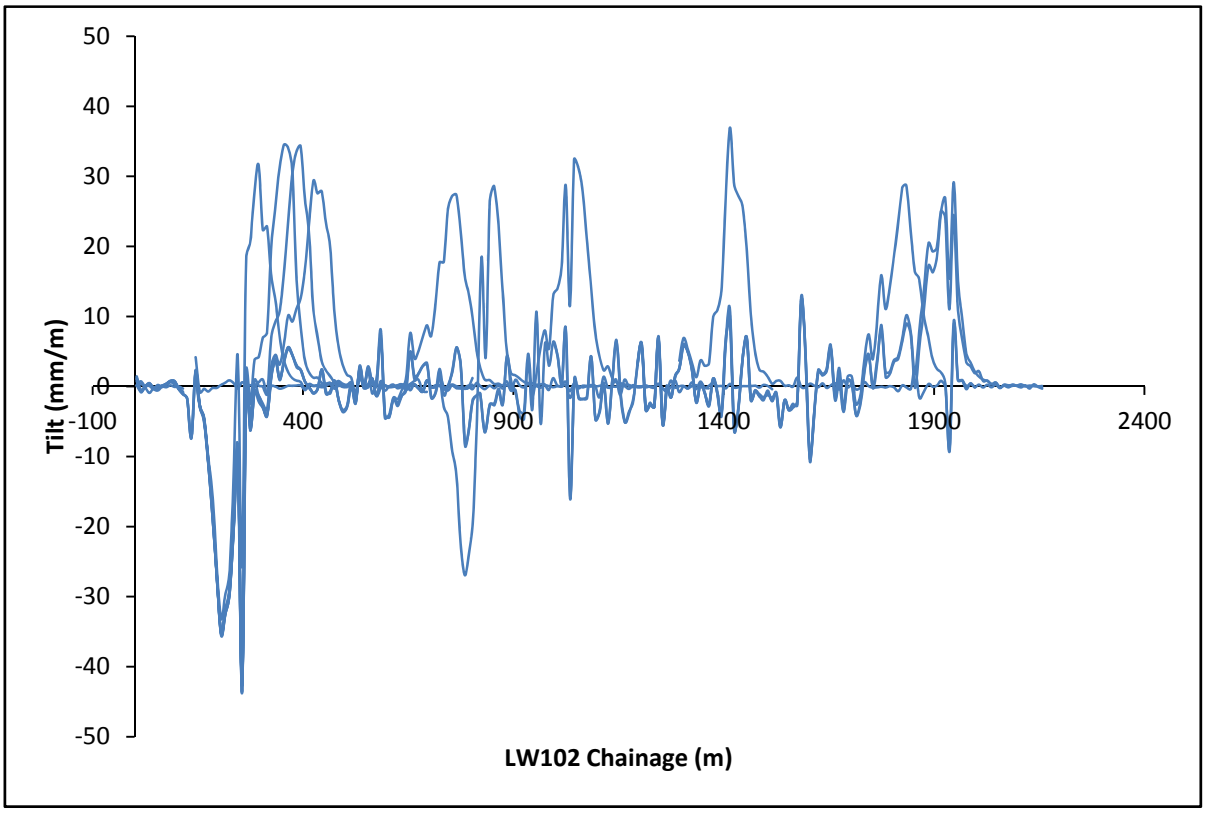


Figure 3: LW102 Tilt

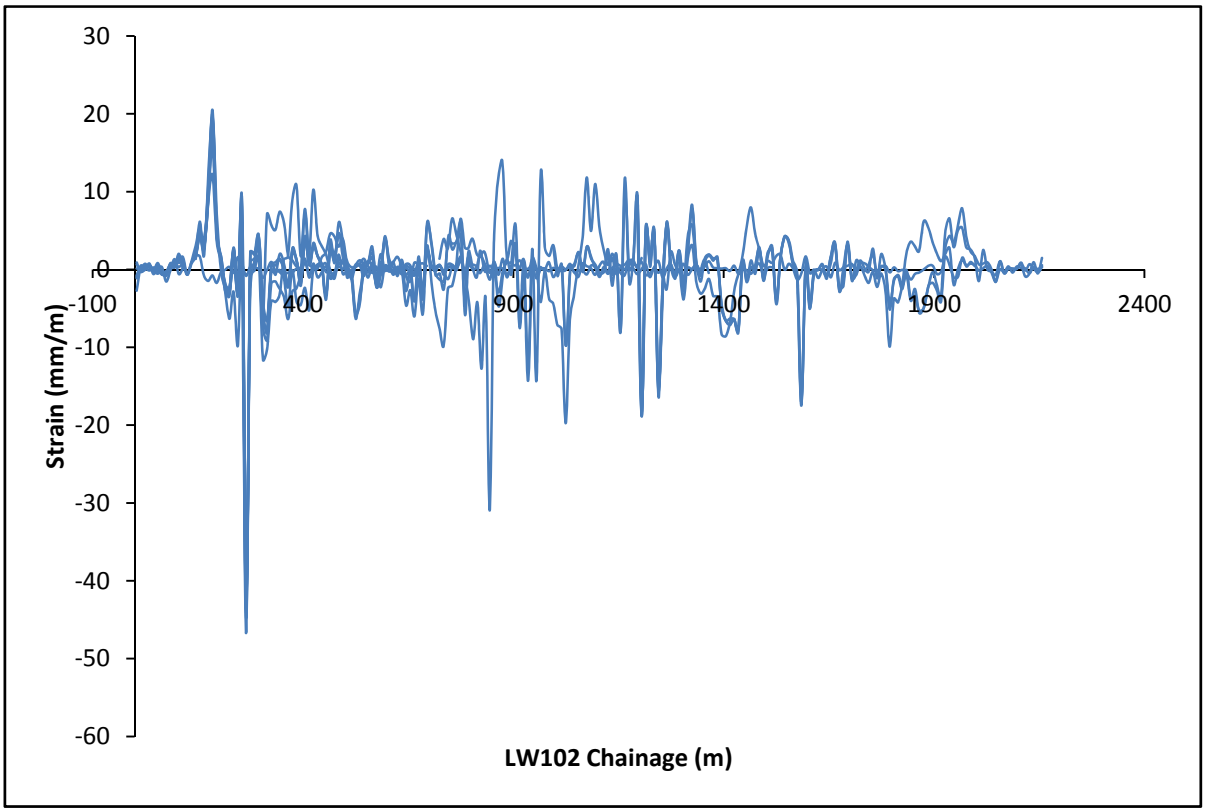


Figure 4: LW102 Strain

The centreline subsidence results for LW102 indicate that the Garrawilla Volcanics and Basalt Sill have not reduced subsidence through spanning behaviour. The maximum subsidence is also considered to be closer to 63% of the maximum mining height of 4.2m, with 71% of the measured maximum values exceeding the prediction based on 58%.

4. SUBSIDENCE IMPACTS

4.1 Monitoring Results from Previous Panels

Refer to Table 3 and Table 4 for the subsidence monitoring undertaken above LW101 during the extraction of LW102. Measured maximum subsidence after the completion of LW101 was 2.606m. Following the extraction of LW102 the maximum subsidence measured above LW101 is 2.628m. The approved Subsidence Monitoring Program requires subsidence to be monitored above LW101 until movement ceases. Narrabri Mine will undertake another subsidence survey above LW101 to determine if movement has ceased in accordance with the Subsidence Monitoring Program. If it is deemed to have ceased then Narrabri Mine will notify the Principal Subsidence Engineer at the Division of Resources and Energy as required by the Subsidence Management Plan (SMP) approval.

4.2 Predictions in the SMP and EA

4.2.1 Natural Features

Pine Creek and Tributaries

Water ponding has been observed in LW102 in two tributaries of Pine Creek, refer to Photo 1 and Photo 2, immediately upstream of the ponding area reported for LW101. The ponding in the tributaries of Pine Creek was predicted to occur in the Stage 2 Longwall Project Environmental Assessment for the Narrabri Mine.

The mine is currently developing a management procedure for the ponding area to formalise the current process of pumping water downstream from the ponding area. Water quality samples are collected monthly from the ponded water. The results are monitored to ensure parameters are not increasing above the baseline levels in the ponded water as this may affect the soils in the area. The results indicate water quality parameters, including pH, EC, TSS, Oil & Grease, and turbidity, are within the range of background levels for the mining area. Baseline information was collected for soils in the ponding area of LW101 as part of the monitoring requirements outlined in the Extraction Plan. This includes electrical conductivity and soil moisture distribution mapping using EM31/38 sensors. Should the ponding of water impact the soils the mine will investigate additional options for management which may include a diversion drain to minimise the level of ponding.

Photo 1: Ponding at LW102 within a Tributary of Pine Creek

Photo 2: Ponding at LW102 within a Tributary of Pine Creek

For the ponding of water in the tributaries in LW102 it is expected that the system will naturally re-adjust to changes as a result of subsidence to reach a dynamic equilibrium. Maximum gradient change measured along the reach between LW101 and LW102 is 5.47%. Small reaches of the creek have increased or decreased in gradient at the upstream and downstream extent of ponding but the channel bed appears stable (as relative to the natural system). Monitoring required by the Land Management Plan, developed as part of the Extraction Plan, noted that no remediation works are recommended for the area of ponding within LW101.

Groundwater Resources

Narrabri Mine has an extensive groundwater monitoring program consisting of 43 monitoring wells. The monitoring can be summarised as follows:

- Nine licenced production wells that Narrabri Mine monitors for water levels and/or water quality in the Namoi River alluvium (WB2-WB7);
- Twenty three standpipe piezometers that Narrabri Mine monitors for water levels and quality within and surrounding the mining lease (P1-P5, P7-P13, P15-P16, P19, P28-P34 & P47); and
- Eleven vibrating wire piezometers (VWP) that Narrabri Mine monitors for water levels within and surrounding the mining lease (P23-P24, P26-P27, P35-P37, P40 & P44-P46).

The eleven VWP's include four life-of-mine groundwater monitoring wells that have been installed as required by the Water Management Plan for the Longwall Project. P47 is a life-of-mine standpipe piezometer targeting the Garrawilla Volcanics to the north of LW102. There are two more VWP's and two more standpipe piezometers to be installed as part of the life-of-mine monitoring program.

The Groundwater Assessment undertaken as part of the Stage 2 Longwall Project EA predicted the following impacts to groundwater resources surrounding the mine site at the end of mining, i.e. Year 29:

- Permian Coal Measures: In the Hoskissons Coal Seam drawdowns of 1m or more are predicted to extend to a maximum of 20km from the mined areas to the southwest and northeast
- Triassic Formations: In the Napperby Formation drawdowns of 1m or more are predicted to extend to a maximum of 10km from the mined area to the southwest and northwest;
- Jurassic Formations: In the Garrawilla Volcanics drawdowns of 1m or more are predicted to extend to between 5 and 8km to the west of the mined areas. The Pilliga Formation is dry within the Longwall project area and therefore no drawdowns are predicted; and
- Quaternary Alluvium/Colluvium/Regolith: In the alluvium/colluvium/regolith drawdowns of 0.5m are predicted to extend up to 3km to the north but drawdown impact is generally limited to the mining lease.

The results of life-of-mine water level monitoring required by the Water Management Plan for the Longwall Operation are provided in Appendix 1. The results indicate that the extraction of the LW102 has not impacted upon water levels surrounding the mine site.

Groundwater inflow monitoring results are described in the Narrabri Mine 2012-2013 Annual Environmental Management Report (AEMR). Groundwater inflows were predicted to vary from 0.22ML/day in the first year to approximately 3.83ML/day in Year 18. During the extraction of LW102 the average daily inflow was calculated to be 1.004ML/day, comprising 0.981ML/day of mine dewatering and 0.022ML/day of pre-drainage water. It should also be noted that while 0.981ML/day was pumped from the underground 0.783ML/day was fed underground for operations and a portion of this water would be captured in the mine dewatering volumes.

Threatened or Protected Species

No threatened or protected species were impacted by the extraction of LW102.

Natural Vegetation

As reported previously, large trees have been impacted by subsidence above LW101 and LW102. Although to a lesser extent in LW102 (refer to Photo 4) given the trees are smaller than those that occur above LW101. In late October 2013, a Senior Botanist supervised the excavation of two recently dead trees along Greylands Road within LW101; a Grey Box approximately 12 m tall (dbh 30 cm) and White Cypress Pine (*Callitris glaucophylla*,

approximately 5 m tall). Both trees were surrounded by healthy wilga trees and other pines (all less than 5 m in height). Due to the size of the excavator, tree roots could only be exposed to a depth of around 1.5 m. The intent was to identify possible sheared or broken roots which may have been caused by subsidence; however, the exposed broken roots observed were likely to have been caused by the excavation. Broken roots were observed in surface cracking in the soil nearby but could not be observed at depth.

Investigations undertaken to date into these tree deaths do not provide any conclusive explanation for the mortality of these larger trees. If possible, additional excavation and assessment of the root ball (using suitability sized equipment) should be undertaken. Better understanding of local water tables and soil moisture conditions may facilitate understanding of the role of soil shear strength and moisture conditions in future subsidence areas. The release of methane gas to the sub-surface (and therefore only reaching the deeper roots of the older trees) should also be considered further. Soils units will also be investigated to assess the potential impacts to trees in different woodland communities that occur across the site.

Narrabri Mine has since provided advice to both the Department of Planning and Infrastructure (DP&I) and the Division of Resources and Energy (DRE) outlining that the above investigations will be undertaken by 30 November 2014.

Land Surface

Informal visual observations in the subsidence area were undertaken as part of general duties in addition to the formal inspections of Greylands Road, required by the Extraction Plan, undertaken when undermining the road. Surface cracks observed were typically 50mm to 100mm wide with some cracks widths up to 200 mm (refer to Photo 3). The cracks were within the predicted range. LW102 was not ploughed and seeded as was undertaken in LW101 during its extraction as very little rainfall and hot conditions over the summer period meant very little soil moisture was available for seed propagation. Ploughing and seeding will be undertaken above LW102 when conditions improve.

Photo 3: Surface Crack in LW102

4.2.2 Public Utilities

Roads

One public road was undermined during the extraction of LW102, known as Greylands Road. Narrabri Mine developed a management plan, known as the Greylands Road Management Plan (GRMP), for this road in consultation with Narrabri Shire Council (NSC) in accordance with Condition 14 of SMP approval 10/9000. The management approach for Greylands Road was approved by DRE on 19 October 2012 and the GRMP which formalised the management measures to be implemented was signed by both Narrabri Mine and NSC on 6 November 2012. As outlined in the GRMP, Narrabri Mine intends to purchase the road as part of its long-term management strategy. The mine has applied to the Crown Lands division of NSW Trade and Investment to purchase the road and the application is currently pending.

Daily inspections during active subsidence were undertaken as outlined in the GRMP and the Built Features Management Plan, part of the Extraction Plan. In accordance with the GRMP, Greylands Road was inspected by NSC and closed prior to undermining. Following mining, Narrabri Mine undertook remediation works in the form of stabilising the surface of the road with gravel (refer to Photo 4). The road remains closed to the general public.

Photo 4: Greylands Road above LW102

Culverts

No culverts were undermined during the extraction of LW102.

Electricity Transmission Lines

Narrabri Mine developed a management plan, known as the Essential Energy Management Plan (EEMP), to manage subsidence impacts to the 11kV power line that traverses LW101 to LW105. The EEMP was agreed to by Essential Energy on 4 February 2013 and approved by DRE as satisfying the requirements of SMP 10/9000 Condition 14 on 12 March 2013. Narrabri Mine implemented the EEMP on 19 and 21 March 2013 by installing sheaves/rollers on the 11kV power line. The line remains disconnected where it tee's off from the main line.

This power line was undermined during December 2013. The lessee of the mine owned "West Haven" property has been provided with an alternative power supply as outlined in the EEMP. Survey monitoring of the power poles and conductor clearances was undertaken as required by the Subsidence Monitoring Program, refer to Table 4.

Telecommunications Lines

No telecommunications infrastructure exists within the Extraction Plan area for LW101 to LW105.

4.2.3 Farm Land and Facilities

Agricultural Utilisation or Agricultural Suitability of Farm Land

No ploughing of the land overlying LW102 has been undertaken due to the hot, dry weather experienced over the summer/autumn period. When soil moisture levels allow, ploughing and seeding of LW102 will be undertaken as outlined in the Landscape Management Plan, part of the Extraction Plan for LW101 to LW105. The only area affected by subsidence where agricultural suitability is impacted is where water ponds at the ephemeral creek. The ponded water is currently pumped downstream when required. The ephemeral nature of the creek system is such that any ponding that does occur will be for relatively short periods only, and on this basis will have negligible effect on agricultural utilisation or agricultural suitability. Water samples are collected in the ponding area to ensure parameters do not increase beyond the baseline levels which may affect the soils in the area, refer to Section 4.2.1.

Farm Buildings or Sheds

No farm buildings or sheds were undermined during the extraction of LW102.

Fences

Fences and gates were undermined during the extraction of LW102. Narrabri Mine has excluded all stock from the active mining area by erecting a fence outside of the subsidence zone to the east of LW101. Any fences/gates required post-mining will be reinstated.

Farm Dams

Four small farm dams were undermined in LW102. Rain in late March 2014 refilled these dams and the dams are now full and holding water. Subsidence has not impacted on the function of the dams.

Soil Conservation Works

Five contour banks, or parts thereof, were undermined during the extraction of LW102. The subsidence impacts to the contour banks did not affect their functionality. However, should remediation works be required, Narrabri Mine will either reinstate the contour banks or remove a section to avoid water ponding.

Wells or Bores

The groundwater data indicates that no private wells were impacted by the extraction of LW102 (refer to Section 4.2.1). No mine installed monitoring bores were directly impacted by the extraction of LW102.

Access Tracks

Access tracks were impacted by the extraction of LW102 however most were in relation to access for mine infrastructure such as boreholes which are now decommissioned. Access tracks along the perimeter of former farm paddocks will be reinstated once mining is complete.

4.2.4 Industrial, Commercial and Business Establishments

Mine Infrastructure

Pipelines connecting gas drainage wells were undermined during the extraction of LW102 however no impacts on this infrastructure were recorded. All gas drainage infrastructure in the active mining area is inspected and maintained to ensure subsidence does not adversely impact this equipment. Narrabri Mine also decommissions gas drainage infrastructure when it is no longer required. The Personal Emergency Device (PED) cable buried around LW101 to LW105 was not impacted by the extraction of LW102.

4.2.5 Other Significant Features

Areas of Archaeological and/or Heritage Significance

Fifteen previously identified cultural heritage sites are located above LW102 being Sites 16-19 and 22-27. Four previously identified cultural heritage sites are located above the chain pillars between LW101 and LW102 being Sites 32-34 and between LW102 and LW103 chain pillars being Sites 28 and 122. Sites 17, 25 and 26 are isolated artefacts. Sites 16, 18-19, 22-24 and 27 are artefacts scatters including up to 18 artefacts (Site 19) located adjacent to the ephemeral creek. Site 122 comprises 6 grinding grooves on 3 sandstone platforms. It was predicted that no impacts would occur to the grinding grooves as they were considered to be located on sandstone floaters. The grinding grooves were not disturbed by subsidence (refer to Photo 5). The artefacts will be subject to further investigation to determine the extent of impacts following subsidence, if any, and then additional management measures may be introduced as required. This could include temporary salvage of artefacts as recommended by the Aboriginal Stakeholders for the mine.

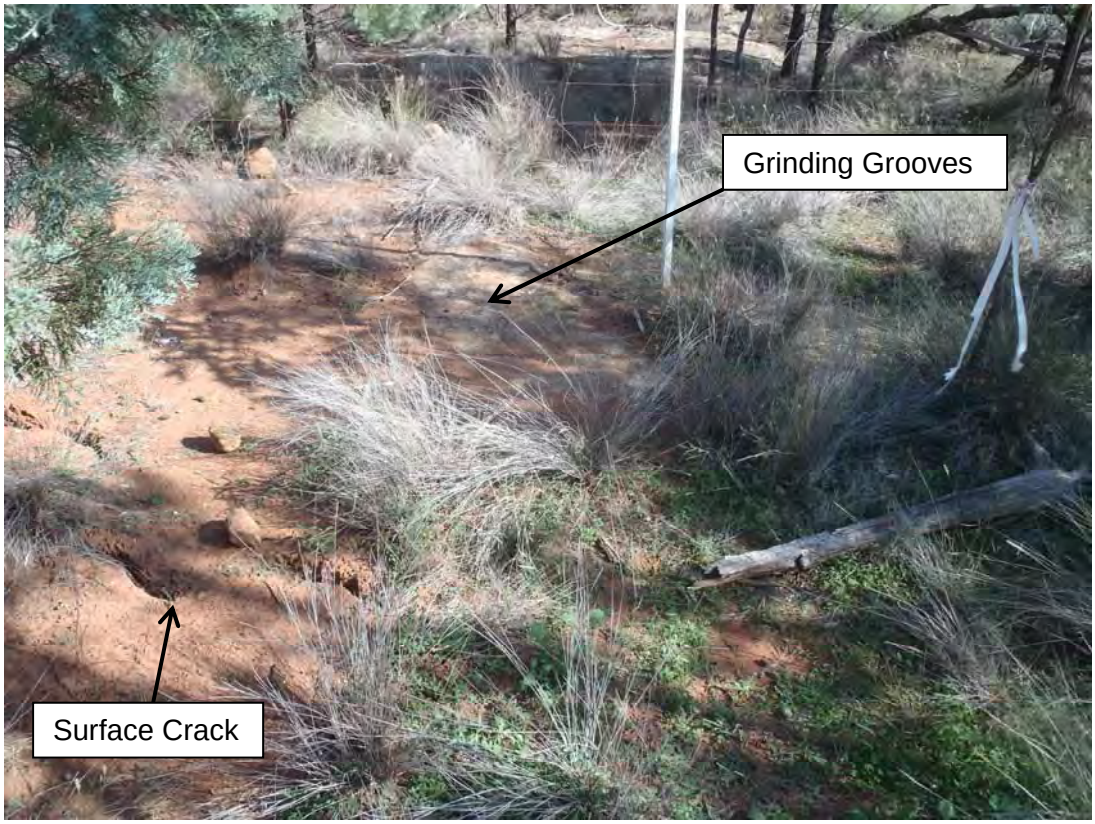


Photo 5: Grinding Grooves on Sandstone Floaters in LW102

5. TRENDS IN MONITORING RESULTS

Subsidence monitoring results for LW101 and LW102 show that measured subsidence is closer to 63% of the cutting height of 4.2m. Predicted subsidence levels were based on 58% of the cutting height of 4.2m, however measured values are within 10% of the maximum predicted. The results also indicate that the Garrawilla Volcanics and Basalt Sill have not reduced subsidence through spanning behaviour.

6. CONSULTATION

During the extraction of LW102 Narrabri Mine consulted with following organisations:

- Essential Energy in relation to the management of the 11kV power line that traverses LW101 to LW105;
- Narrabri Shire Council (NSC) in relation to the management of the one public road in the extraction area known as Greylands Road; and
- Division of Resources and Energy (DRE) in relation to subsidence results.

On 18 February 2014 representatives from DRE, DP&I and the EPA attended site to undertake an Annual Environmental Management Report (AEMR) inspection. During this inspection the representatives were taken to the subsidence area and observed the tree death above LW101 and LW102. Additional information was requested following this meeting by the DP&I and DRE, refer to Section 4.2.1.

Discussions are ongoing with the resident at the mine owned “West Haven” property which has been provided with an alternative power supply as required by the Essential Energy Management Plan (EEMP).

6.1 Community Complaints

No community complaints were received in relation to subsidence and subsidence related impacts during the extraction of LW102.

6.2 Narrabri Mine Community Consultative Committee

Narrabri Mine’s Community Consultative Committee (CCC) receives updates on the progress of the mine at the quarterly meetings including subsidence impacts. Concerns were raised by the CCC in relation to potential water ponding in LW102. Narrabri Mine undertook an investigation into the extent of ponding that could occur in LW102. The data provided to the CCC shows that ponding in LW102 will be generally limited to within the banks of the ephemeral creeks and not to the extent that has occurred in LW101, refer to Figure 5. Copies of the Narrabri Mine CCC meeting minutes are available on the Whitehaven Coal website.

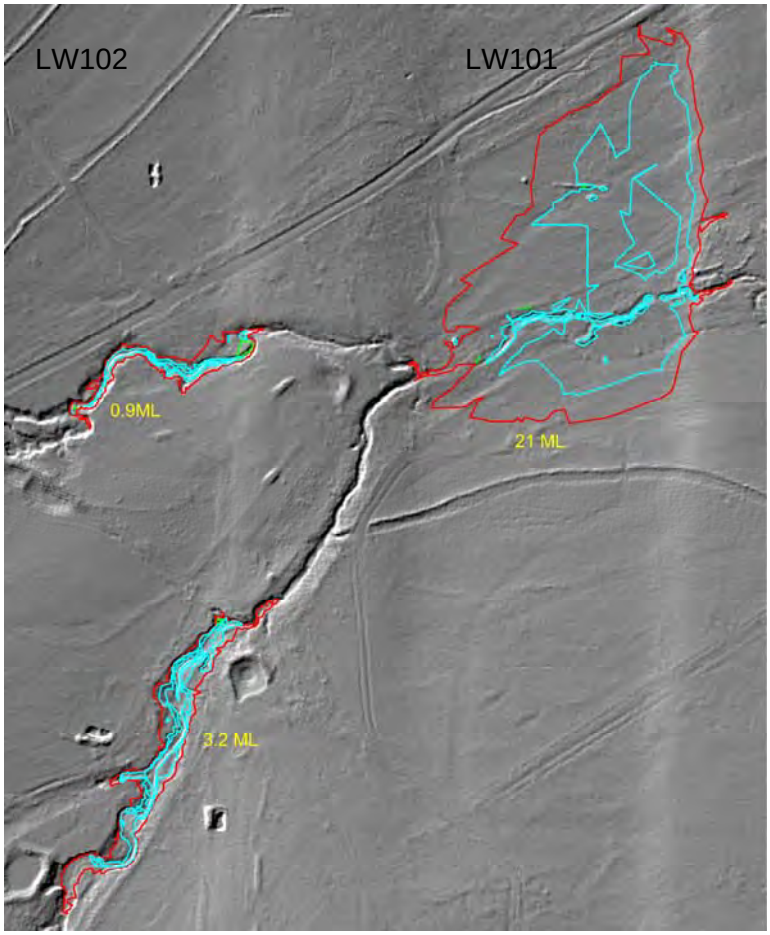
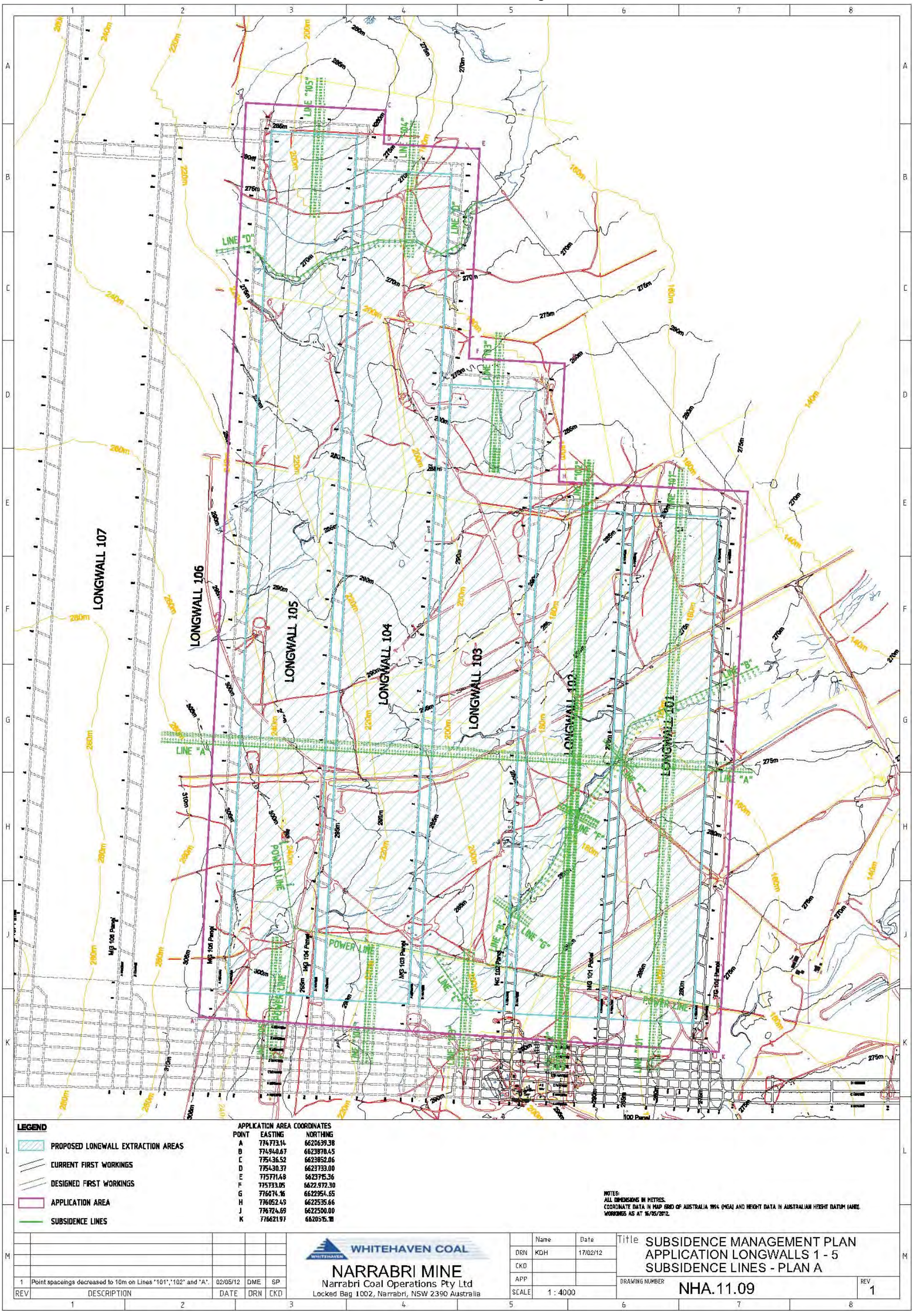


Figure 5: Ponding Levels in LW101 and LW102

Attachment 1: Narrabri Mine Subsidence Monitoring Lines LW101 to LW105



Appendix 1: Narrabri Mine Groundwater Monitoring Results

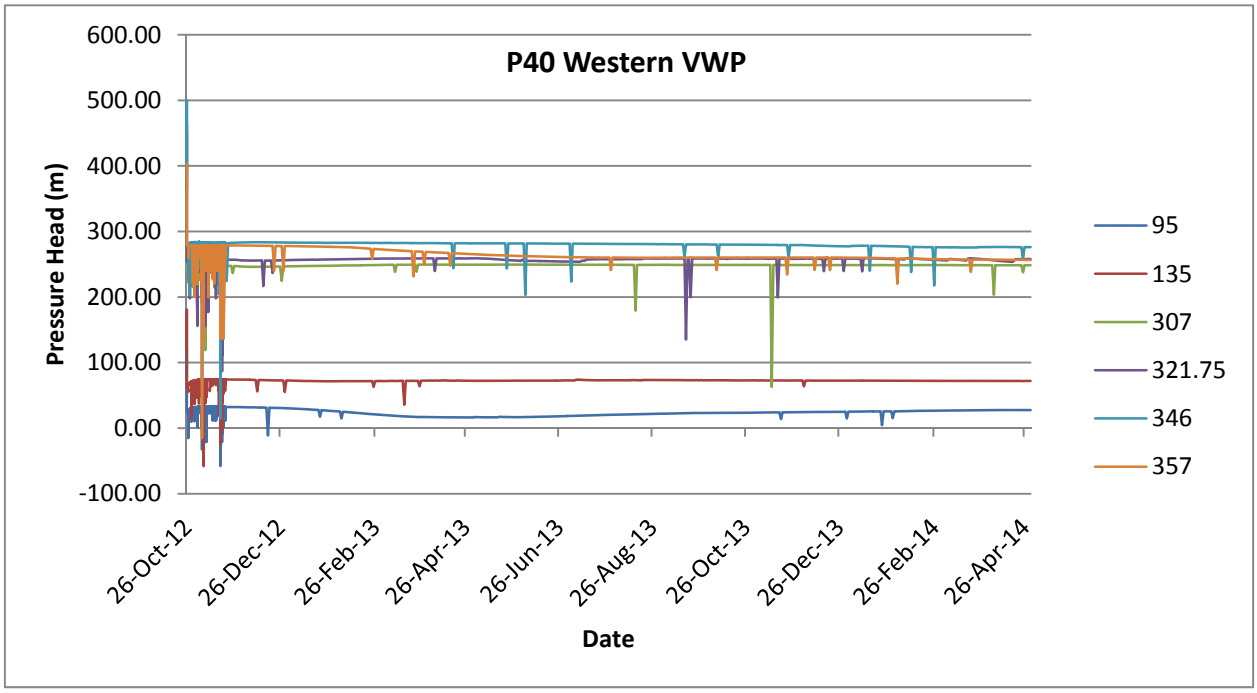


Figure 1: P40 Monitoring Results

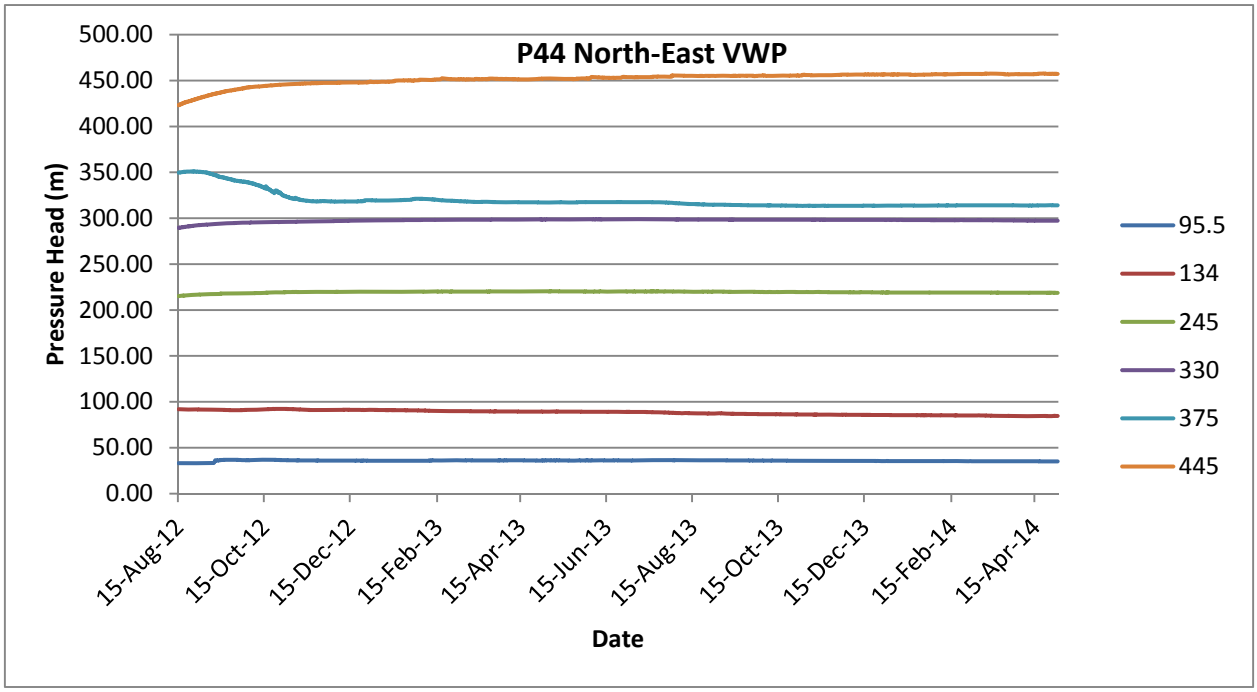


Figure 2: P44 Monitoring Results

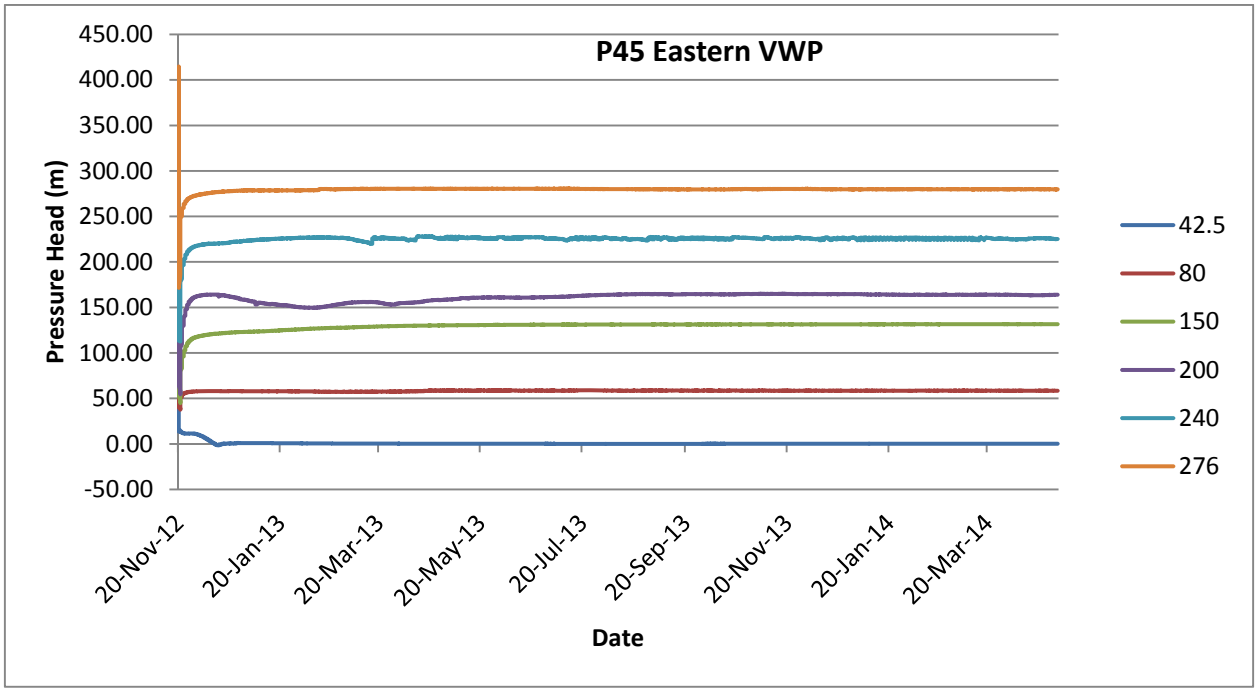


Figure 3: P45 Monitoring Results

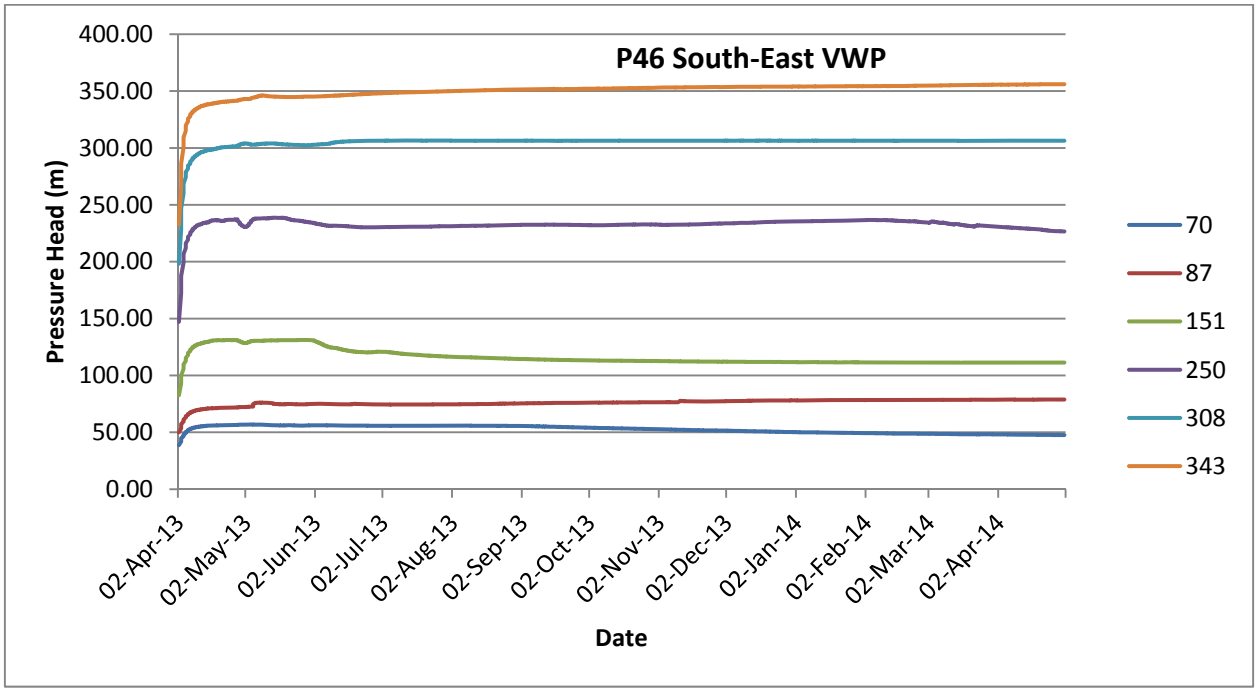


Figure 4: P46 Monitoring Results

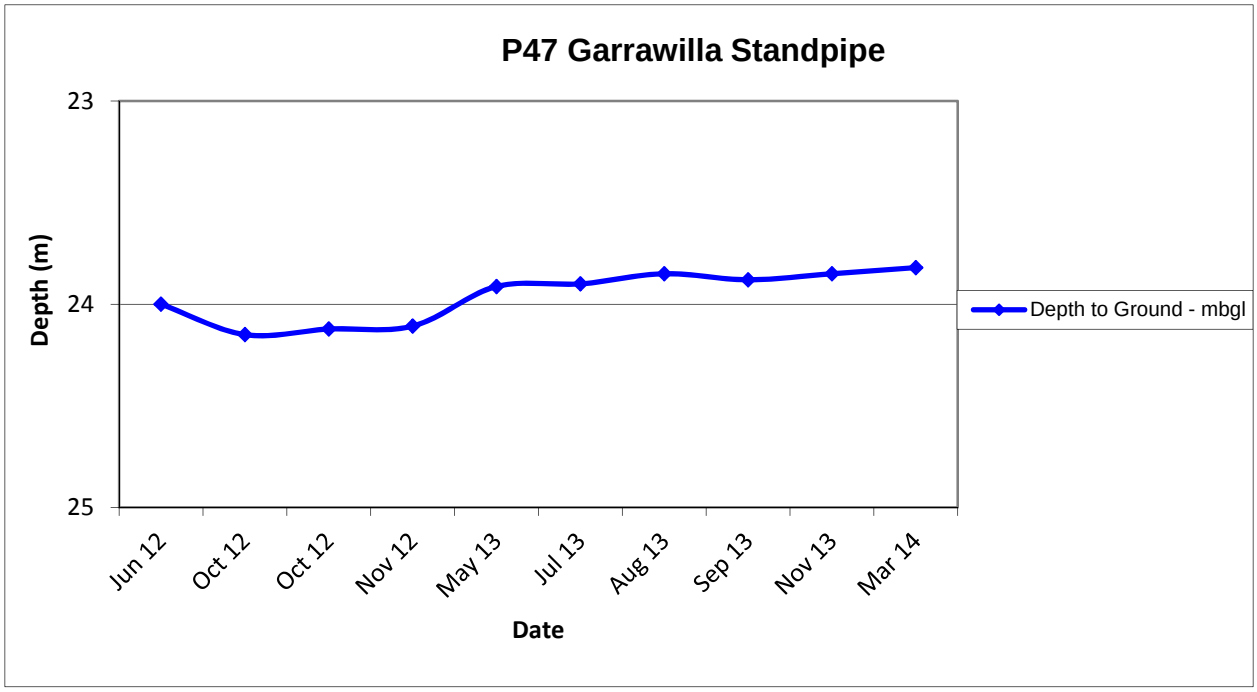


Figure 5: P47 Monitoring Results