Centennial Newstan (Awaba) Colliery
2014 End of Year
Subsidence Management Report

Report Number: **7**

Reporting Period: **2014**

Distribution List:

DTIRIS – Department of Trade & Investment, Regional Infrastructure & Services

- DTIRIS – Director Environmental Sustainability
- DTIRIS - Subsidence Executive Officer
- DTIRIS - District Inspector
- DTIRIS - Principal Subsidence Engineer
- DTIRIS - Subsidence Engineer
- NOW – NSW Office of Water
- OEH - Office of Environment & Heritage
- DOP&E – Department of Planning & Environment
- Ausgrid
- RailCorp (Transport NSW),
- Mine Subsidence Board,
- Eraring Energy,
- Telstra
- Newstan (Awaba) Mine Manager,
- Newstan (Awaba) Environmental Coordinator.

General Comments:

Stage 1:

- Approval to mine Stage 1 of Mine Subsidence Management Plan (MSMP) at Awaba Colliery was granted on 03/09/2007
- Mining completed on 26/06/2009.
- Monitoring variation from 3 to 6 monthly approved 28/06/2011.
- January and March 2014 resurveys recorded greater than predicted maximum subsidence along Main South Crossline between XL24 to XL66 – and 8NE Centreline between CL01 to CL16
- In response - monitoring was temporarily increased to fortnightly in the active subsidence area until stable results are achieved.
- There have been relatively stable results achieved in recent months.

Stage 2:

- Approval to mine Stage 2 of MSMP at Awaba Colliery was granted on 29/08/2008
- Mining completed on 08/03/2012.
- Monitoring variation from 3 to 6 monthly approved 31/05/2013.
- July 2014 resurvey recorded greater than predicted subsidence along Main South Crossline Extension between XLE01to XLE22 – and 8SW Centreline between 8SW22 to 8SW43.
- In response - monitoring was temporarily increased to fortnightly in the active subsidence area until stable results are achieved.
- There have been relatively stable monitoring results achieved in recent months.

3 North:

- Approval to mine MSMP 3 NORTH Area - Awaba Colliery was granted on 13/05/2009
- Mining completed on 25/01/2010.
- Monitoring results show subsidence within predictions.
- Subsidence monitoring in the 3 North Area was completed on 31/01/2013.
- Monitoring points remain in place for future reference.

Stage 3:

- Approval to mine Stage 3 of MSMP at Awaba Colliery was granted on 15/12/2010
- Mining Completed on 22/12/2011.
- Monitoring variation from 3 to 6 monthly approved 31/05/2013.
- Additional amendments to Stage 3 monitoring program in consultation with Principal Subsidence Engineer (PSE) and relevant stakeholders.
- Monitoring results show subsidence within predictions.
- There continues to be relatively stable results recorded from surveys.

East B Area:

- Approval to mine MSMP East B Area at Awaba Colliery was granted on 27/07/2011
- Mining Completed on 21/12/2011.
- Monitoring results show subsidence within predictions.
- Subsidence monitoring in the East B Area was completed on 31/01/2013.
- Monitoring points remain in place for future reference.

Awaba Colliery Great Northern Seam Mining Ceased 08/03/2012.

- All Awaba Mine entries (Drifts and Shafts) were sealed in August 2012.
- Underground workings are no longer accessible.

SMP Approval Condition No.	Requirement Summary	Comment / Description
22 (a) – Stage 1 23 (a) – Stage 2 18 (a) – 3 North 24 (a) – Stage 3 18 (a) – East B	**Summary of Subsidence and Environmental Monitoring Results**	The Following subsidence surveys and inspections have been completed: ***Surface Surveys –*** All scheduled subsidence surveys completed to December 31st, 2014. All scheduled environmental monitoring completed to December 31st, 2014. **Maximum subsidence** in **2014 period** was in Main South **Stage 2** - XLE17 (-1.378 m in December), which is greater than the defined predicted subsidence levels. A resurvey in January 2014 found greater than predicted subsidence in Main South **Stage 1** Area - along Main South Crossline between XL24 to XL66 – and 8NE Centreline between CL01 to CL16. Maximum subsidence was at XL52 (-388mm). In response to the January results – a further resurvey was done in March 2014. The maximum subsidence was at XL40 (-1112mm) on Main South Crossline in Stage 1. No visual signs of subsidence have been observed in Stage 1 Area.

SMP Approval Condition No.	Requirement Summary	Comment / Description
		A resurvey in July 2014 found greater than predicted subsidence in Main South **Stage 2** Area - along Main South Crossline Extension between XLE01 to XLE22 – and 8SW Centreline between 8SW22 to 8SW43. Maximum subsidence was at XLE17 (-1255mm). A visual inspection conducted on 14/07/2014 found evidence of minor surface impacts within these areas. Visual signs of subsidence (0.1–0.2 metre steps and cracks) were observed in vicinity of MSXLE 17 to 20, and 8SW28 to 31. **Stage 3** Subsidence monitoring results in 2014 were well within predicted levels and continue to be relatively stable. Visual Inspections found one case of surface impacts in Stage 3. This impact was a sinkhole - found following heavy rain over the June 2011 long weekend. The hole was approximately 33x38 metres in surface area with cover ranging between 26-30 metres. A subsequent inspection has found evidence of the sinkhole beginning to partially reactivate. This sinkhole has been included in the Sinkhole Rehabilitation Schedule.

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		Environmental inspections were carried out in January 2014. Traversing between transects involved walking along over a kilometre of Stony Creek, including part of a tributary. The 2014 survey found no impact on Stony Creek, and is the last Ecological Survey. ***Underground Surveys –*** All Awaba Mine entries (Drifts and Shafts) were sealed in August 2012 Underground workings are no longer accessible.
22 (b) – Stage 1 23 (b) – Stage 2 18 (b) – 3 North 24 (b) – Stage 3 18 (b) – East B	**Analysis of Subsidence and Environmental Monitoring Results**	January and March Surveys of 2014 found greater than predicted subsidence in Main South **Stage 1** Area. A report was prepared by a geotechnical consultant with regard to this event. The subsidence has had no adverse impact on surface infrastructure. Centennial Survey prepared a plan showing zones of subsidence along monitoring points in relation to surface features and underground workings to help bring perspective to results. A PDF of this plan was sent to relevant government departments and stakeholders. The significant increase in subsidence has occurred approximately 175 to 300 metres from the Main Northern Railway Line. There is no subsidence impact on monitoring points nearer to the Main Northern Railway, Ulan Rail

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		Loop, Haul Road, Haul Road Bridge, Telstra Tower or Railcorp and Ausgrid Power Poles. There have been no observed visual environmental impacts in Stage 1 Area. No visual disturbance has been identified on tracks & trails during routine inspections. July 2014 Surveys found greater than predicted subsidence in Main South **Stage 2** Area. Centennial Survey prepared a plan showing zones of subsidence along monitoring points in relation to surface features and underground workings to help bring perspective to results. A PDF of this plan was sent to relevant government departments and stakeholders. The significant increase in subsidence occurred approximately 250 to 350 metres from the Main Northern Railway Line. There is no subsidence impact on monitoring points nearer to the Main Northern Railway, Ulan Rail Loop, Haul Road, Haul Road Bridge, Telstra Tower or Railcorp and Ausgrid Power Poles. Cracking has been observed in the Stage 2 area associated with the greater

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		then predicted subsidence. No visual disturbance has been identified on tracks & trails during routine inspections. **Stage 3** Subsidence monitoring results in 2014 were within predicted levels and continue to be relatively stable. Environmental impacts in Stage 3 have been confined to the one sinkhole as described above. It is most likely linked to a significant rainfall event in June 2011.
22 (c) – Stage 1 23 (c) – Stage 2 18 (c) – 3 North 24 (c) – Stage 3 18 (c) – East B	**Trends in Monitoring Results**	In general - the trend in monitoring results shows that the majority of subsidence occurs during and shortly after mining extraction. In the following months the rate of subsidence decreases toward a stable environment. However after approximately 6 years of relative stability – there has been greater than predicted subsidence in Main South **Stage 1** and **Stage 2**. During the year – after the initial sudden increase in subsidence - results began to trend toward decreasing movement. In recent months surveys have consistently shown relatively stable results.

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22 (d) – Stage 1 23 (d) – Stage 2 18 (d) – 3 North 24 (d) – Stage 3 18 (d) – East B	**Management Actions of Potential Impacts**	In general - current Public Safety and Subsidence Management Plans are considered adequate. The current monitoring schedule is based on 6 monthly resurveys. Following the greater than predicted subsidence in Stage 1 and Stage 2 - Agreed temporary amendments have been in place to include fortnightly monitoring of 8NE, 9SW, 8SW and 6SW – and monthly monitoring of MSXL and MSXLE. Following greater than predicted subsidence in **Stage 1** Main South Cross line / 8NE Centreline area; All relevant government agencies and stakeholders were notified as per condition 20 after results of January survey. Centennial Newstan conducted a follow up survey – including strain measurements in early March. The results were distributed to relevant government agencies and stakeholders. A visual inspection was carried out on 21/03/2014 - by a Geotechnical consultant accompanied by the Mine Manager and Mine Surveyor. No visual signs of subsidence were observed. The results were included in a geotechnical report. A meeting between Centennial Newstan and PSE was held on 25/03/2014 to discuss the mechanics and management of this occurrence. A report prepared by a geotechnical consultant with regard to this event was distributed to Transport NSW and the PSE on 27/03/2014. Further reports were distributed on 2/6/2014 and 23/6/2014. A meeting to discuss the increased subsidence in Stage 1 was held in Chatswood on 02/04/2014. It was attended by the Principal Subsidence

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		Engineer (PSE), Centennial Newstan, an independent geotechnical consultant, and Transport NSW. During the Chatswood meeting – it was agreed to temporarily increase the frequency of surveys until a trend of stable results was achieved. Note that as agreed during the meeting in Chatswood - subsidence of 50mm or greater observed within the Railway Protection Zone (RPZ) - will trigger further communication and review of the situation. Monitoring frequency was increased on 04/04/2014 to provide further data until the area becomes stable; and to monitor any possible increased subsidence moving toward the rail corridor. The increased frequency of surveys continues to the present. Following greater than predicted subsidence in **Stage 2** Main South Crossline Extension / 8SW Centreline area; All relevant government agencies and stakeholders were notified as per condition 21 after results of July survey. A visual inspection carried out by the Mine Surveyor found evidence of minor surface impacts within these areas. Results were forwarded to PSE, relevant government departments and stakeholders on 14/07/2014. Agreement was reached with the PSE and Transport NSW - to increase monitoring frequency to provide further data until the area becomes stable; and to monitor any possible increased subsidence moving toward the rail corridor. Subsidence of 50mm or greater observed within the Railway Protection Zone (along 8SW) or the Railway Mining Barrier (along 6SW) - will trigger further communication and review of the situation.

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		Monitoring frequency was increased on 16/07/2014. The increased frequency of surveys continues to the present. Following the formation of the Stage 3 Sinkhole in June 2011 -The relevant government authorities and stake holders were informed within 24 hours of the discovery of the hole. Rehabilitation of the site has since been completed. The location of the sinkhole was plotted and is shown on the Stage 3 Face Position plan AW2176. Due to the partial reactivation of this hole - further rehabilitation works are planned in accordance with the Sinkhole Rehabilitation Plan.

Grant Watson

Centennial Newstan (Awaba) Colliery - Mine Manager

For any comments or questions please contact
Grant WATSON– Mine Manager
Ph.(W) 02 49560227 or
Mob. 0438 560 227
grant.watson@centennialcoal.com.au