



Monitoring of the Nepean River and its associated tributaries is undertaken in accordance with the approved Appin Area 9 Extraction Plan (EP). Monitoring is conducted by the Illawarra Coal Environmental Field Team (ICEFT) on a monthly basis prior to mining and weekly when the longwall is within 400 m of features. Water quality and surface water levels are measured along with photographic and observational records. Longwall 902 began extraction on 12th May 2018 and, as of the 17th July 2018, had progressed approximately 431 m.

During the latest inspection of the Nepean River, on the 16th July 2018, one new gas zone was identified. Additionally, 12 other previously reported gas release zones were active on the Nepean River (Table 1).

AA9_LW902_001 (E 287733, N6214551)

Impact *AA9_LW902_001* is a gas release zone on the Nepean River, which is comprised of three intermittent releases within an area of approximately 5 m by 1 m (Figure 1 and Photo 1). At the time of inspection, the site was approximately 976 m lateral distance from the goaf of Longwall 902.

Impact *AA9_LW902_001* is a Level 1 Trigger as per the Trigger Action Response Plan (TARP) in the Appin Area 9 EP: Annex B - Subsidence Monitoring Program (Appendix A, Table 2):

Identification of strata gas plume of flow rate < 3000 L/min.



Photo 1: AA9_LW902_001, looking downstream towards the gas release zone. Taken 16th July 2018.

Corrective Management Actions (CMAs)

- Continue monitoring program
- Submit an Impact Report to relevant stakeholders
- Report in the End of Panel Report
- Summarise actions and monitoring in the AEMR

Table 1: Subsidence impacts recorded for Longwalls 901 and 902. Highlighted row refers to latest impact, discussed. Activity on last inspection is based on inspection date 16th July 2018.

inspection is based on ins	pection date 16th July	2018.				
Site	Identification Date	Activating Longwall	Туре	Trigger Level	Comment	Activity on Last Inspection
AA9_LW901_001	2/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_002	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_003	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_004	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_005	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_006	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_007	15/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_008	18/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_009	18/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_010	18/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_011	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_012	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_013	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_014	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_015	29/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Allens Creek	Inactive
AA9_LW901_016	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_017	08/04/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_018	21/04/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_019	4/04/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_020	4/04/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_021	26/04/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_022	26/04/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_023	17/07/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_024	5/05/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_025	5/05/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_026	31/01/2018	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_001	18/07/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active

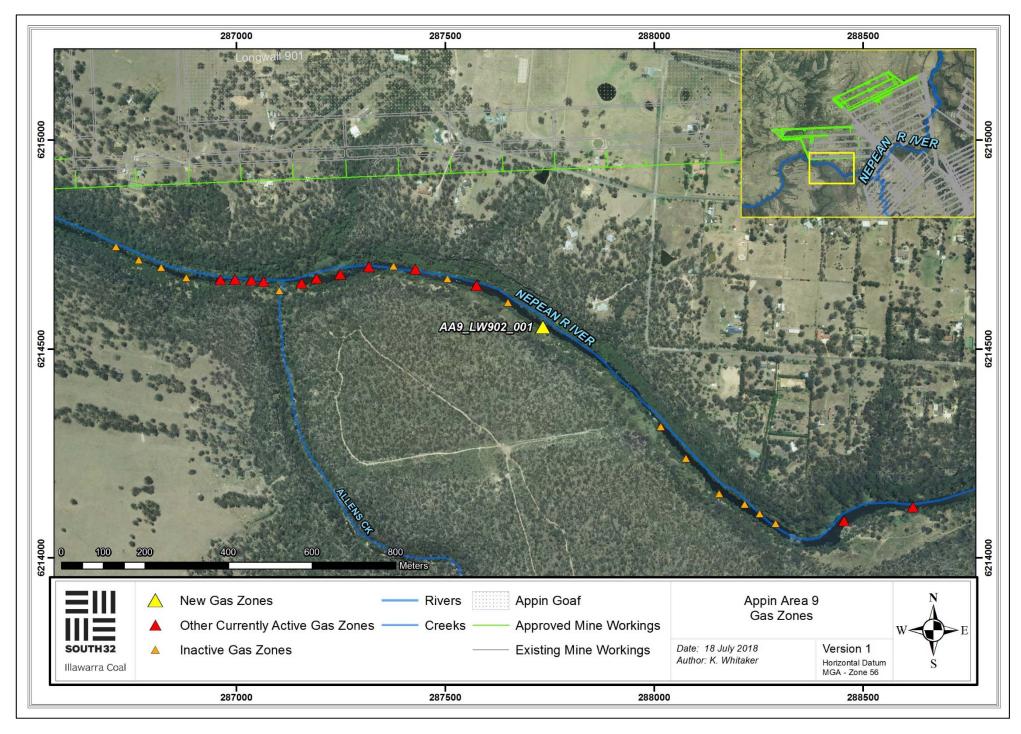


Figure 1: Status of gas release zones in Appin Area 9 in reference to the latest inspection.

Table 2: AA9 Master TARP, Key Monitoring, Triggers and Response

Monitoring	Trigger	Action
WATER QUALITY		
Adjacent and downstream sites: • Nepean River: - NR0 - SW3 (NR1) - NR2 - If and where strata gas emission plumes above 3000 L/min are detected	 Level 1* Impact monitoring sites when comparing the baseline period to the mining period for that site: pH reduction greater than 1 standard deviation but less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months DO reduction greater than 1 standard deviation but less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months DO reduction greater than 1 standard deviation but less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months Identification of strata gas plume of flow rate < 3000 L/min Level 2* Impact monitoring sites when comparing the baseline period to the mining period for that site: 	Continue monitoring program Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers Report in the End of Panel Report Summarise actions and monitoring in AEMR Actions stated for Level 1 Review monitoring program Notify relevant technical specialists and seek advice on any CMA required
	 pH reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months EC, total Fe and total Mn increases greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months Identification of strata gas plume of flow rate >3000 L/min 	 Notity relevant technical specialists and seek advice on any CMA required Implement agreed CMAs as approved <u>Note</u>: CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. water quality changes with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts Strata Gas Emission Plume: Estimate gas emission flow rates. Re-estimate should significant change be observed Take sample of plume (if possible) for: chemical composition dissolved methane from exactly above gas plume and at established downriver monitoring site dissolved sulfide and total phenols from exactly above gas plume and at
	 Level 3* Impact monitoring sites when comparing the baseline period to the mining period for that site: Level 2-type reduction in water quality resulting from the mining observed for more than 6 consecutive months 	 nearest downriver monitoring site Actions stated for Level 2 Notify OEH, DP&I, NoW, DPI, DRE, relevant resource managers and technical specialists and seek advice on any CMA required Invite stakeholders for site visit Develop site CMA (subject to stakeholder feedback) Completion of works following approvals, including monitoring and reporting on success Review the TARP and Management Plan in consultation with key stakeholders Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. water quality changes with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts

APPIN AREA 9 – LONGWALL 902

Impact Report

4th September 2018



Monitoring of the Nepean River and tributaries is undertaken in accordance with the approved Appin Area 9 Extraction Plan (EP). Monitoring is conducted by the Illawarra Coal Environmental Field Team (ICEFT) monthly prior to mining and weekly when the longwall is within 400 m of features. Water quality and surface water levels are measured along with photographic and observational records. Longwall 902 began extraction on 12th May 2018 and, as of the 17th July 2018 had progressed approximately 760 m.

During the latest inspection of the Nepean River, on 4th September 2018, one new gas zone was identified. Eleven gas zones in total were active during this inspection (Table 1).

AA9_LW902_002 (E 287705, N6214562)

Impact AA9_LW902_002 is a gas release zone on the Nepean River, comprised of five small, constant releases within an area of approximately 10 m² (Figure 1, Photo 1 and 2). At the time of inspection, the site was approximately 870 m lateral distance from Longwall 902.

Impact AA9_LW902_002 is a Level 1 Trigger as per the Trigger Action Response Plan (TARP) in the Appin Area 9 EP: Annex B - Subsidence Monitoring Program (Appendix A, Table 2):

• Identification of strata gas plume of flow rate < 3000 L/min.



Photo 1: AA9_LW902_002, looking cross-stream towards the gas release zone. Taken 4/09/2018.

Photo 2: AA9_LW902_002, zoom to gas release. Taken 4/09/2018.

Corrective Management Actions (CMAs)

- Continue monitoring program
- Submit an Impact Report to relevant stakeholders
- Report in the End of Panel Report
- Summarise actions and monitoring in the AEMR

 Table 1: Subsidence impacts recorded for Longwalls 901 and 902. Highlighted row refers to latest impact. Activity on last inspection is based on inspection date 4th September 2018.

is based on inspection of	late 4 th September 20)18.				
Site	Identification Date	Activating Longwall	Туре	Trigger Level	Comment	Activity on Last Inspection
AA9_LW901_001	2/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_002	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_003	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_004	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_005	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_006	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_007	15/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_008	18/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_009	18/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_010	18/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_011	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_012	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_013	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_014	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_015	29/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Allens Creek	Inactive
AA9_LW901_016	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_017	08/04/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_018	21/04/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_019	4/04/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_020	4/04/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_021	26/04/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_022	26/04/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_023	17/07/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_024	5/05/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_025	5/05/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_026	31/01/2018	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_001	18/07/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_002	4/09/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active

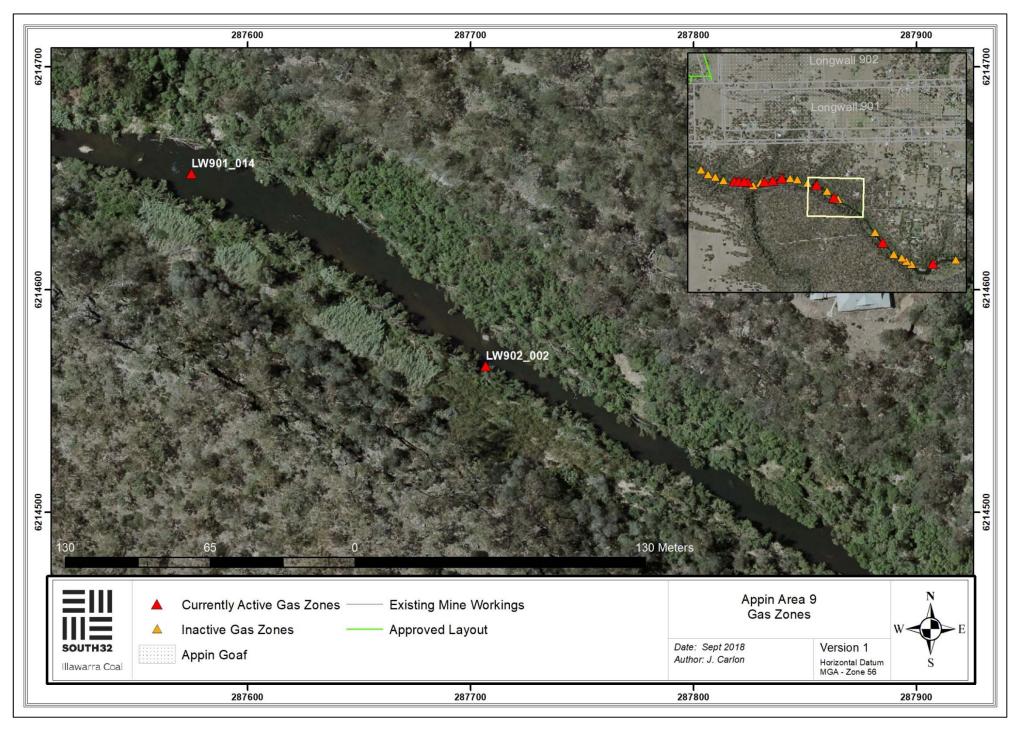


Table 2: AA9 Master TARP, Key Monitoring, Triggers and Response

Monitoring	Trigger	Action
WATER QUALITY		
Adjacent and downstream sites: • Nepean River: - NR0 - SW3 (NR1) - NR2 - If and where strata gas emission plumes above 3000 L/min are detected	 Level 1* Impact monitoring sites when comparing the baseline period to the mining period for that site: pH reduction greater than 1 standard deviation but less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months DO reduction greater than 1 standard deviation but less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months Identification of strata gas plume of flow rate < 3000 L/min Level 2* Impact monitoring sites when comparing the baseline period to the mining period for that site: pH reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months EC, total Fe and total Mn increases greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months Identification of strata gas plume of flow rate >3000 L/min 	 Continue monitoring program Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers Report in the End of Panel Report Summarise actions and monitoring in AEMR Actions stated for Level 1 Review monitoring program Notify relevant technical specialists and seek advice on any CMA required Implement agreed CMAs as approved Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. water quality changes with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts Strata Gas Emission Flume: Estimate gas emission flow rates. Re-estimate should significant change be observed Take sample of plume (if possible) for: chemical composition dissolved methane from exactly above gas plume and at established downriver monitoring site dissolved sulfide and total phenols from exactly above gas plume and at
	 Level 3* Impact monitoring sites when comparing the baseline period to the mining period for that site: Level 2-type reduction in water quality resulting from the mining observed for more than 6 consecutive months 	 nearest downriver monitoring site Actions stated for Level 2 Notify OEH, DP&I, NoW, DPI, DRE, relevant resource managers and technical specialists and seek advice on any CMA required Invite stakeholders for site visit Develop site CMA (subject to stakeholder feedback) Completion of works following approvals, including monitoring and reporting on success Review the TARP and Management Plan in consultation with key stakeholders <u>Note</u>: CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. water quality changes with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts

APPIN AREA 9 – LONGWALL 902

Impact Report

30 January 2019



Monitoring of the Nepean River and its associated tributaries is undertaken in accordance with the approved Appin Area 9 Extraction Plan (EP). Monitoring is conducted by the Illawarra Coal Environmental Field Team (ICEFT) monthly prior to mining and weekly when the longwall is within 400 m of features. Water quality and surface water levels are measured along with photographic and observational records. Longwall 902 began extraction on 12 May 2018, and as of 20 January 2019 had progressed approximately 1820 m.

During the latest inspection of the Nepean River, on 29 January 2019, one new gas zone was identified. 10 gas zones in total were active during this inspection (Table 1).

AA9_LW902_003 (E 288805, N6214172)

Impact AA9_LW902_003 is a gas release zone on the Nepean River, comprised of four small, intermittent releases within an area of approximately 5m² (Photo 1 and Photo 2). The site is approximately 1300m lateral distance from Longwall 902 panel (Figure 1).

Impact AA9_LW902_003 is a Level 1 Trigger as per the Trigger Action Response Plan (TARP) in the Appin Area 9 EP: Annex B - Subsidence Monitoring Program (Appendix A, Table 1):

• Identification of strata gas plume of flow rate < 3000 L/min.



Photo 1: Gas release zone AA9_LW902_003 on the Nepean River. Taken 29/01/2019.



Photo 2: Gas release zone AA9_LW902_003 on the Nepean River. Taken 29/01/2019.

Corrective Management Actions (CMAs)

- Continue monitoring program
- Submit an Impact Report to relevant stakeholders
- Report in the End of Panel Report
- Summarise actions and monitoring in the AEMR

Table 1: Subsidence impacts recorded for Longwalls 901 and 902. Highlighted row refers to latest impact. Activity on last inspection is based on inspection date 29 January 2019.

Site	Identification Date	Activating Longwall	Туре	Trigger Level	Comment	Activity on Last Inspection
AA9_LW901_001	2/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_002	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_003	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_004	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_005	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_006	7/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_007	15/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_008	18/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_009	18/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_010	18/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_011	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_012	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_013	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_014	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_015	29/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Allens Creek	Inactive
AA9_LW901_016	21/03/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_017	08/04/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_018	21/04/2016	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_019	4/04/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_020	4/04/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_021	26/04/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_022	26/04/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW901_023	17/07/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_024	5/05/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_025	5/05/2017	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW901_026	31/01/2018	LW901	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_001	18/07/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_002	4/09/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
	29/01/2019	LW902	Gas Zone	Level 1	Gas Zone in	Active

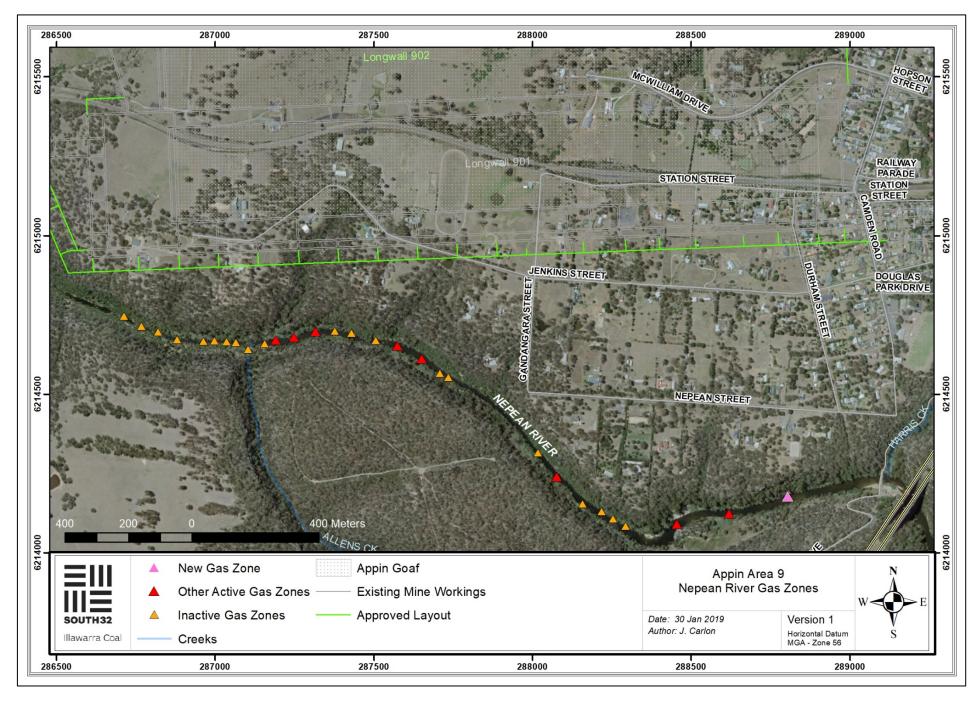


Figure 1: Nepean River gas release zones in relation to Appin Area 9.

Table 1: Extract from Appin Area 9 Trigger Action Response Plan

Monitoring	Trigger	Action
WATER QUALITY		·
Adjacent and downstream sites:	Level 1*	Continue monitoring program
Nepean River: NR0	Impact monitoring sites when comparing the baseline period to the mining period for that site:	 Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers
 NR0 SW3 (NR1) NR2 If and where strata gas emission plumes above 3000 L/min are detected 	 pH reduction greater than 1 standard deviation but less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months DO reduction greater than 1 standard deviation but less than 2 	 Report in the End of Panel Report Summarise actions and monitoring in AEMR
	 bo reduction greater than a standard deviation out less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months 	
	 Identification of strata gas plume of flow rate < 3000 L/min 	
	Level 2*	Actions stated for Level 1
	Impact monitoring sites when comparing the baseline period to the	 Review monitoring program
	mining period for that site:	 Notify relevant technical specialists and seek advice on any CMA required
	 pH reduction greater than 2 standard deviation from pre-mining 	Implement agreed CMAs as approved
	mean resulting from the mining for two consecutive months	<u>Note</u> : CMAs are to be proposed based on appropriate management of
	 DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months 	environmental and other consequences of mining impacts i.e. water quality changes with insignificant consequences may not require specific CMAs other
	 EC, total Fe and total Mn increases greater than 2 standard deviation from pre-mining mean resulting from the mining for two 	than ongoing monitoring to confirm there are no ongoing impacts
	consecutive months	Strata Gas Emission Plume:
	 Identification of strata gas plume of flow rate >3000 L/min 	 Estimate gas emission flow rates. Re-estimate should significant change be observed
		 Take sample of plume (if possible) for:
		 chemical composition
		 dissolved methane from exactly above gas plume and at established downriver monitoring site
		 dissolved sulfide and total phenols from exactly above gas plume and at nearest downriver monitoring site
	Level 3*	Actions stated for Level 2
	Impact monitoring sites when comparing the baseline period to the mining period for that site:	 Notify OEH, DP&I, NoW, DPI, DRE, relevant resource managers and technical specialists and seek advice on any CMA required
	Level 2-type reduction in water quality resulting from the mining	 Invite stakeholders for site visit
	observed for more than 6 consecutive months	 Develop site CMA (subject to stakeholder feedback)
		 Completion of works following approvals, including monitoring and reporting on success
		Review the TARP and Management Plan in consultation with key stakeholders
		<u>Note</u> : CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. water quality changes with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts

3 May 2019



Monitoring of the Nepean River and its associated tributaries is undertaken in accordance with the approved Appin Area 9 Extraction Plan (EP). Monitoring is conducted by the Illawarra Coal Environmental Field Team (ICEFT) monthly prior to mining and weekly when the longwall is within 400m of features. Water quality and surface water levels are measured along with photographic and observational records. Groundwater levels are also recorded at key boreholes around the mining area. Longwall 902 began extraction 12 May 2018 and was completed 3 April 2019.

During the latest inspection of the Nepean River two new gas zones were identified. Thirteen gas zones in total were active during this latest inspection (Figure 1).

A groundwater decline has been observed in borehole S2060 following extraction of Longwall 902.

AA9_LW902_004 (E 289876, N 6214000)

Impact *AA9_LW902_004* is a gas release zone on the Nepean River comprising five light, intermittent releases within an area of approximately 5m² (**Error! Reference source not found.**). The site is approximately 1720m lateral distance from the end of Longwall 902 (Figure 1). This gas zone is on the edge of the Longwall 16 goaf, extracted by Tower Colliery. Longwall 16 completed extraction in 1999.

Impact *AA9_LW902_004* is a Level 1 Trigger as per the Trigger Action Response Plan (TARP) in the Appin Area 9 EP: Annex B - Subsidence Monitoring Program (Appendix A, Table 1):

• Identification of strata gas plume of flow rate < 3000 L/min.



Photo 1: Gas release zone AA9_LW902_004 on the Nepean River. Taken on 26/04/2019.

AA9_LW902_005 (E 288692, N 6214136)

Impact *AA9_LW902_005* is a gas release zone on the Nepean River, comprising five light releases approximately 70 metres downstream of gas release zone *AA9_LW901_022* (Photo 2). The site is approximately 1330m lateral distance from Longwall 902 (Figure 1).

Impact *AA9_LW902_005* is a Level 1 Trigger as per the Trigger Action Response Plan (TARP) in the Appin Area 9 EP: Annex B - Subsidence Monitoring Program (Appendix A, Table 1):

Identification of strata gas plume of flow rate < 3000 L/min.



Photo 2: General location where AA9_LW902_005 was identified on Nepean River. Taken 27/02/2019. Photo of gas release not available due to photo error.

Gas Zone Corrective Management Actions (CMAs)

- Continue monitoring program
- Submit an Impact Report to relevant stakeholders
- Report in the End of Panel Report
- Summarise actions and monitoring in the AEMR

Table 1: Gas releases recorded for Longwall 902. Highlighted rows refer to latest gas zones. Activity on last inspection is based on inspection date 26 April 2019.

Site	Identification Date	Activating Longwall	Туре	Trigger Level	Comment	Activity on Last Inspection
AA9_LW902_001	18/07/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_002	4/09/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW902_003	29/01/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW902_004	26/04/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW902_005	26/04/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active

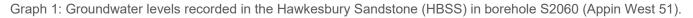
Groundwater Monitoring

A groundwater decline has been observed in borehole S2060 (Appin West 51) following extraction of Longwall 902. The decline was observed in the HBSS piezometer installed at a depth of 267 m below ground level.

Prior to mining in Appin Area 9, pressure in the piezometer was stabilising at RL of 51.8m (March 2015). The borehole was passed by Longwall 902 in January 2019 at a horizontal distance of 34m. Following the compression subsidence phase resulting from Longwall 902 extraction, the water pressure began to reduce and on 11 February 2019 the pressure dropped below 31.8m (i.e. 20m below the baseline level). Two months later, on 11 April, the pressure was at 18.0m (Graph 1).

Specialist assessment of groundwater levels is being undertaken as part of the groundwater assessment of the Longwall 902 End of Panel Report.





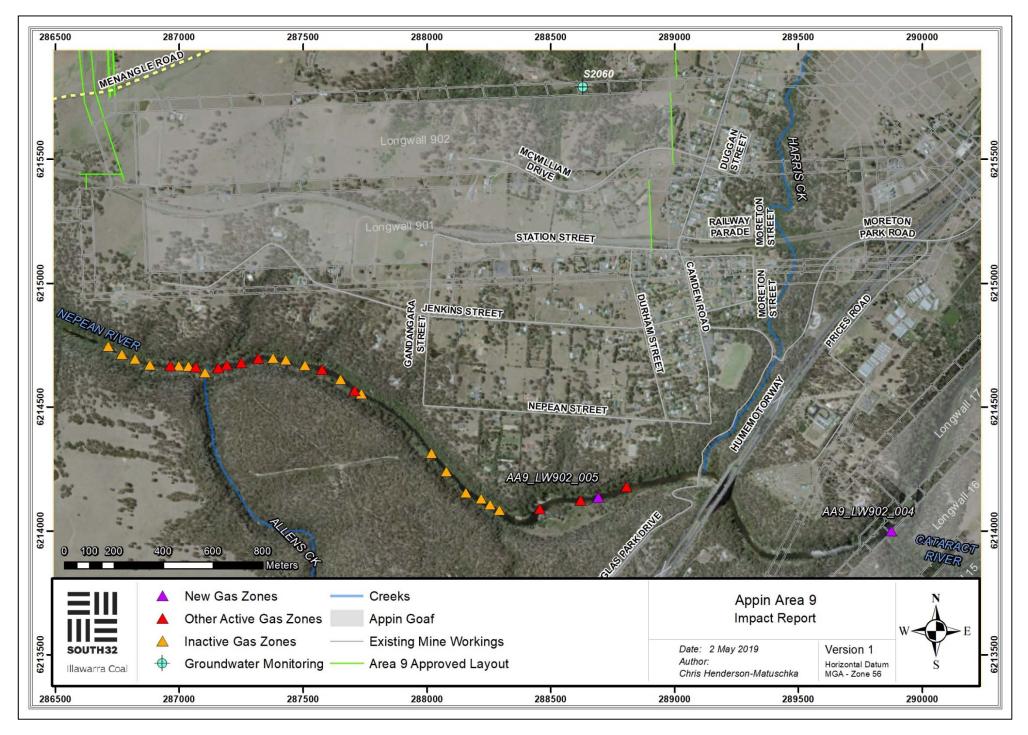


Figure 1: Subsidence impacts and monitoring in relation to Appin Area 9.

 Table 1: Extract from Appin Area 9 Trigger Action Response Plan

Monitoring	Trigger	Action
WATER QUALITY		
Adjacent and downstream sites:	Level 1*	Continue monitoring program
Nepean River: NR0	Impact monitoring sites when comparing the baseline period to the mining period for that site:	 Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers
 NR0 SW3 (NR1) NR2 If and where strata gas emission plumes above 3000 L/min are detected 	 pH reduction greater than 1 standard deviation but less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months DO advantage greater than 4 standard deviation but less than 2 	 Report in the End of Panel Report Summarise actions and monitoring in AEMR
	 DO reduction greater than 1 standard deviation but less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months 	
	Identification of strata gas plume of flow rate < 3000 L/min	
	Level 2*	Actions stated for Level 1
	Impact monitoring sites when comparing the baseline period to the mining period for that site:	 Review monitoring program Notify relevant technical specialists and seek advice on any CMA required
	 pH reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months 	Implement agreed CMAs as approved
	 DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months 	<u>Note</u> : CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. water quality changes with insignificant consequences may not require specific CMAs other
	 EC, total Fe and total Mn increases greater than 2 standard deviation from pre-mining mean resulting from the mining for two 	than ongoing monitoring to confirm there are no ongoing impacts
	consecutive months	Strata Gas Emission Plume:
	 Identification of strata gas plume of flow rate >3000 L/min 	 Estimate gas emission flow rates. Re-estimate should significant change be observed
		Take sample of plume (if possible) for:
		 chemical composition
		 dissolved methane from exactly above gas plume and at established downriver monitoring site
		 dissolved sulfide and total phenols from exactly above gas plume and at nearest downriver monitoring site
	Level 3*	Actions stated for Level 2
	Impact monitoring sites when comparing the baseline period to the mining period for that site:	 Notify OEH, DP&I, NoW, DPI, DRE, relevant resource managers and technical specialists and seek advice on any CMA required
	Level 2-type reduction in water guality resulting from the mining	 Invite stakeholders for site visit
	observed for more than 6 consecutive months	 Develop site CMA (subject to stakeholder feedback)
		 Completion of works following approvals, including monitoring and reporting on success
		Review the TARP and Management Plan in consultation with key stakeholders
		<u>Note</u> : CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. water quality changes with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts

31 May 2019



Monitoring of the Nepean River and its associated tributaries is undertaken in accordance with the approved Appin Area 9 Extraction Plan (EP). Monitoring is conducted by the Illawarra Coal Environmental Field Team (ICEFT) monthly prior to mining and weekly during mining. Water quality and surface water levels are measured along with photographic and observational records. Longwall 902 began extraction on 12 May 2018 and was completed on 3 April 2019. During the latest inspection of the *Nepean River* one new gas zone was identified. Twelve gas zones in total were active during this latest inspection (Figure 1).

AA9_LW902_006 (E 288955, N 6214209)

AA9_LW902_006 is a gas release zone on the Nepean River comprised of three light, intermittent releases within an area of approximately 1.5m by 0.5m (Photo 1). The site is approximately 1260m from Longwall 902 at its closest point (Figure 1).

AA9_LW902_006 is a Level 1 Trigger as per the Trigger Action Response Plan (TARP) in the Appin Area 9 EP: Annex B - Subsidence Monitoring Program (Appendix A, Table 1):



Identification of strata gas plume of flow rate < 3000 L/min.

Photo 1: Gas release zone AA9_LW902_006 on the Nepean River. Taken on 24/05/2019.

Gas Zone Corrective Management Actions (CMAs)

Monitoring and reporting will continue as required by the EP. The following actions have been initiated:

- Continue monitoring program
- Submit an Impact Report to relevant stakeholders
- Report in the End of Panel Report
- Summarise actions and monitoring in the AEMR

 Table 1: Gas releases recorded for Longwall 902. Highlighted rows refer to latest gas zones. Activity on last inspection is based on inspection date 24 May 2019.

Site	Identification Date	Activating Longwall	Туре	Trigger Level	Comment	Activity on Last Inspection
AA9_LW902_001	18/07/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW902_002	4/09/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_003	29/01/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW902_004	26/04/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_005	26/04/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW902_006	24/05/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active

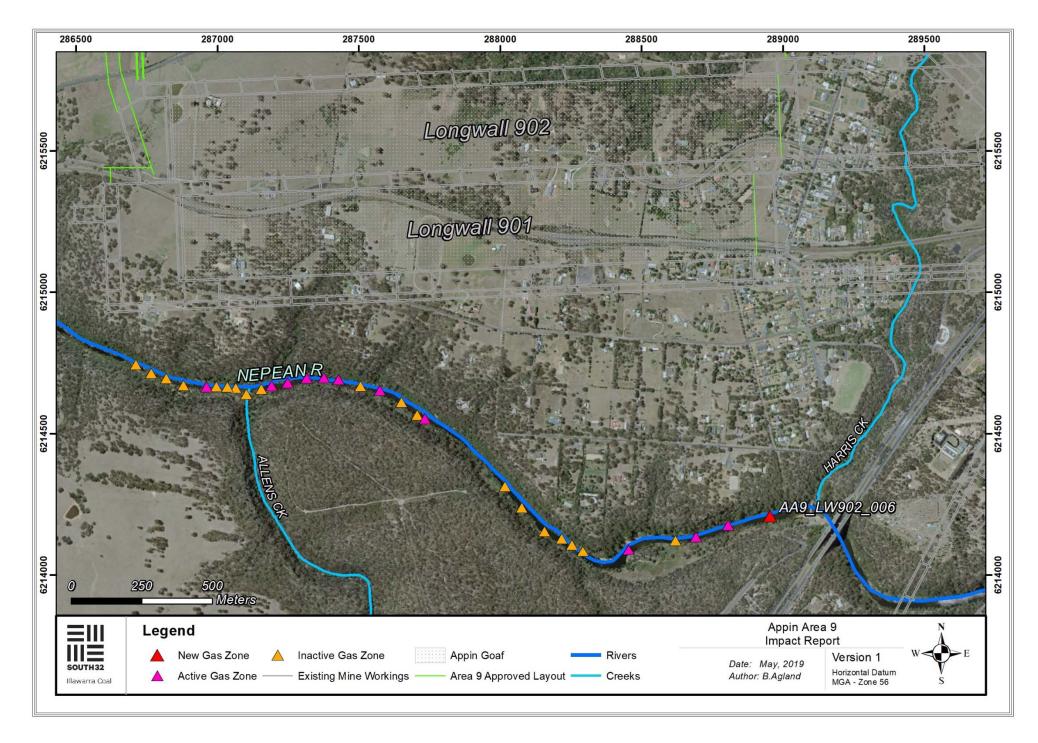


 Table 1: Extract from Appin Area 9 Trigger Action Response Plan

Monitoring	Trigger	Action
WATER QUALITY		
Adjacent and downstream sites:	Level 1*	Continue monitoring program
Nepean River: NR0	Impact monitoring sites when comparing the baseline period to the mining period for that site:	 Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers
 NR0 SW3 (NR1) NR2 If and where strata gas emission plumes above 3000 L/min are detected 	 pH reduction greater than 1 standard deviation but less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months DO advantage greater than 4 standard deviation but less than 2 	 Report in the End of Panel Report Summarise actions and monitoring in AEMR
	 DO reduction greater than 1 standard deviation but less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months 	
	Identification of strata gas plume of flow rate < 3000 L/min	
	Level 2*	Actions stated for Level 1
	Impact monitoring sites when comparing the baseline period to the mining period for that site:	 Review monitoring program Notify relevant technical specialists and seek advice on any CMA required
	 pH reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months 	Implement agreed CMAs as approved
	 DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months 	<u>Note</u> : CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. water quality changes with insignificant consequences may not require specific CMAs other
	 EC, total Fe and total Mn increases greater than 2 standard deviation from pre-mining mean resulting from the mining for two 	than ongoing monitoring to confirm there are no ongoing impacts
	consecutive months	Strata Gas Emission Plume:
	 Identification of strata gas plume of flow rate >3000 L/min 	 Estimate gas emission flow rates. Re-estimate should significant change be observed
		Take sample of plume (if possible) for:
		 chemical composition
		 dissolved methane from exactly above gas plume and at established downriver monitoring site
		 dissolved sulfide and total phenols from exactly above gas plume and at nearest downriver monitoring site
	Level 3*	Actions stated for Level 2
	Impact monitoring sites when comparing the baseline period to the mining period for that site:	 Notify OEH, DP&I, NoW, DPI, DRE, relevant resource managers and technical specialists and seek advice on any CMA required
	Level 2-type reduction in water guality resulting from the mining	 Invite stakeholders for site visit
	observed for more than 6 consecutive months	 Develop site CMA (subject to stakeholder feedback)
		 Completion of works following approvals, including monitoring and reporting on success
		Review the TARP and Management Plan in consultation with key stakeholders
		<u>Note</u> : CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. water quality changes with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts

Monitoring	Trigger	Action
	Exceeding Performance Measures	Actions stated for Level 3
	Mining results in more than negligible gas releases, iron staining or	 Investigate reasons for the exceedance
	water cloudiness	 Update future predictions based on the outcomes of the investigation
		 Provide environmental offset if CMAs are unsuccessful
GROUNDWATER		
Groundwater flow into the mine	Level 1*	Continue monitoring program
Registered Bores:	 Increase in water flow from the goaf between 2.7 to 3 ML/day (over 20 day average) 	 Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers
GW 34425	 5.0 – 7.5 m reduction in the Hawkesbury Sandstone greater than 	Report in the End of Panel Report
GW 35033	predicted standing water level or pressure (outside of pumping influences in private bores) over a minimum 2 month period	 Summarise actions and monitoring in AEMR
GW 72249		
GW 100673	Level 2*	Actions stated for Level 1
GW 101133	Increase in water flow from the goaf between 3 to 3.4ML (over 20	Review monitoring program
GW 102043	day average)	Notify relevant technical specialists and seek advice on any CMA required
GW 102584	 7.5 – 10 m reduction in the Hawkesbury Sandstone greater than predicted standing water level or pressure (outside of pumping 	 Implement agreed CMAs as approved
GW 102798	influences in private bores) over a minimum 2 month period	<u>Note:</u> CMAs are to be proposed based on appropriate management of
GW 102798 GW 103161		environmental and other consequences of mining impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other
		than ongoing monitoring to confirm there are no ongoing impacts
GW 104068		
GW 104602	Level 3*	Actions stated for Level 2
GW 104661	 Abnormal increase in water flow from the goaf >3.4ML (20 day processe) 	 Notify OEH, DP&I, DPI, NoW, DRE, relevant resource managers and technical appaielists and each advise an appr CMA required
GW 110671	 average) >10m reduction in the Hawkesbury Sandstone standing water level 	specialists and seek advice on any CMA required. Invite stakeholders for site visit
	or pressure (outside of pumping influences in private bores) over a	Develop site CMA (subject to stakeholder feedback). This may include:
BHPBIC Piezometers:	minimum 2 month period	 Make area safe
EAW9	 Mining results in groundwater bores unsafe, unserviceable or damaged 	 Any actions agreed to in the Property Subsidence Management Plan
EAW18	uanageu	 Provisions of alternate water supply where this has been impacted by
EAW58		mining MOD to see all any information does and humining
PROSP A		 MSB to repair any infrastructure damaged by mining Completion of works following approvals, including monitoring and reporting
PROSP B		 Completion of works following approvals, including monitoring and reporting on success
		Review the Groundwater Model, TARP and Management Plan in consultation with key stakeholders
		<u>Note</u> ; CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts

19 August 2019



Monitoring of the Nepean River and its associated tributaries is undertaken in accordance with the approved Appin Area 9 Extraction Plan (EP). Monitoring is conducted by the Illawarra Coal Environmental Field Team (ICEFT) monthly prior to mining and weekly during mining. Water quality and surface water levels are measured along with photographic and observational records. Longwall 902 began extraction on 12 May 2018 and was completed on 3 April 2019. During the latest inspection of the *Nepean River* one new gas zone was identified. Nine gas zones in total were active during the latest inspection (Figure 1).

AA9_LW902_007 (E 287982, N 6214357)

AA9_LW902_007 is a gas release zone on the Nepean River comprised of five moderate, constant releases within an area of approximately 5m by 5m (Photo 1). The site is approximately 1075m from Longwall 902 at its closest point (Figure 1).

AA9_LW902_007 is a Level 1 Trigger as per the Trigger Action Response Plan (TARP) in the Appin Area 9 EP: Annex B - Subsidence Monitoring Program (Appendix A, Table 1):



• Identification of strata gas plume of flow rate < 3000 L/min.

Photo 1: Gas release zone AA9_LW902_007 on the Nepean River. Taken on 15/08/2019.

Corrective Management Actions (CMAs)

Monitoring and reporting will continue as required by the EP. The following actions have been initiated:

- Continue monitoring program
- Submit an Impact Report to relevant stakeholders
- Report in the End of Panel Report
- Summarise actions and monitoring in the AEMR

 Table 1: Gas releases recorded for Longwall 902. Highlighted rows refer to latest gas zones. Activity on last inspection is based on inspection date 15 August 2019.

Site	Identification Date	Activating Longwall	Туре	Trigger Level	Comment	Activity on Last Inspection
AA9_LW902_001	18/07/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW902_002	4/09/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW902_003	29/01/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_004	26/04/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_005	26/04/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_006	24/05/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_007	15/08/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active

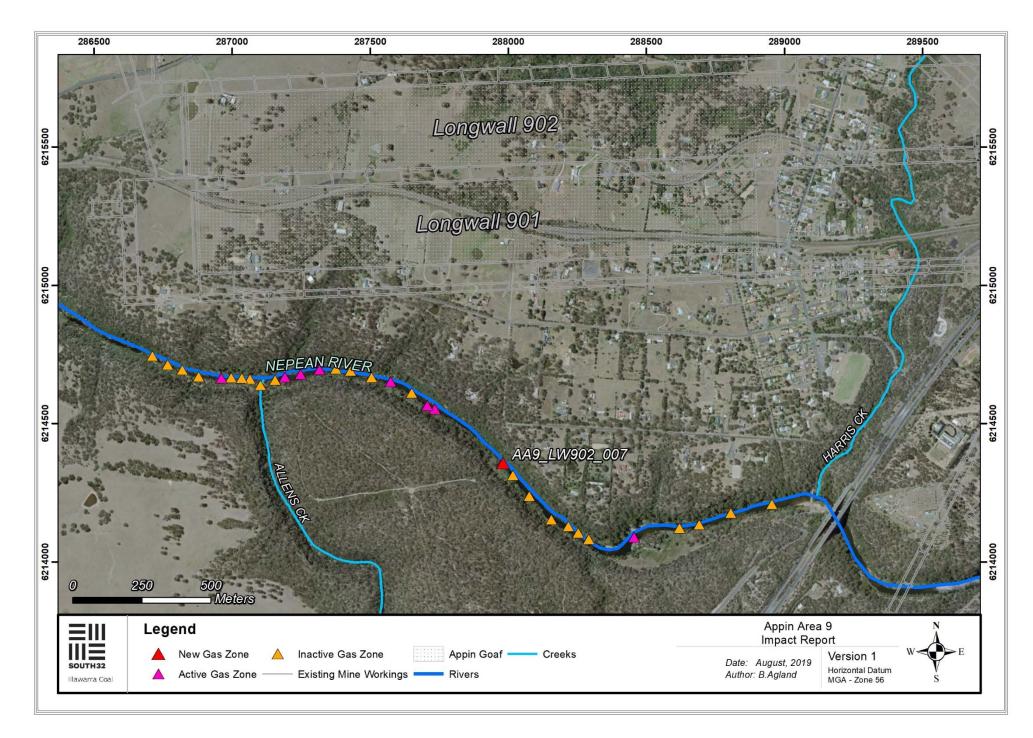


 Table 2: Extract from Appin Area 9 Trigger Action Response Plan

Monitoring	Trigger	Action
WATER QUALITY		
Adjacent and downstream sites: • Nepean River: - NR0 - SW3 (NR1) - NR2 • If and where strata gas emission plumes above 3000 L/min are detected	 Level 1* Impact monitoring sites when comparing the baseline period to the mining period for that site: pH reduction greater than 1 standard deviation but less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months DO reduction greater than 1 standard deviation but less than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months Identification of strata gas plume of flow rate < 3000 L/min Level 2* Impact monitoring sites when comparing the baseline period to the 	Continue monitoring program Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers Report in the End of Panel Report Summarise actions and monitoring in AEMR Actions stated for Level 1 Review monitoring program
	 mining period for that site: pH reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months EC, total Fe and total Mn increases greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months Identification of strata gas plume of flow rate >3000 L/min 	 Notify relevant technical specialists and seek advice on any CMA required Implement agreed CMAs as approved <u>Note</u>: CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. water quality changes with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts Strata Gas Emission Plume: Estimate gas emission flow rates. Re-estimate should significant change be observed Take sample of plume (if possible) for: chemical composition dissolved methane from exactly above gas plume and at established downriver monitoring site dissolved sulfide and total phenols from exactly above gas plume and at
	 Level 3* Impact monitoring sites when comparing the baseline period to the mining period for that site: Level 2-type reduction in water quality resulting from the mining observed for more than 6 consecutive months 	 nearest downriver monitoring site Actions stated for Level 2 Notify OEH, DP&I, NoW, DPI, DRE, relevant resource managers and technical specialists and seek advice on any CMA required Invite stakeholders for site visit Develop site CMA (subject to stakeholder feedback) Completion of works following approvals, including monitoring and reporting on success Review the TARP and Management Plan in consultation with key stakeholders <u>Note</u>: CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. water quality changes with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts

Monitoring	Trigger	Action	
	Exceeding Performance Measures	Actions stated for Level 3	
	Mining results in more than negligible gas releases, iron staining or	 Investigate reasons for the exceedance 	
	water cloudiness	 Update future predictions based on the outcomes of the investigation 	
		 Provide environmental offset if CMAs are unsuccessful 	
GROUNDWATER			
Groundwater flow into the mine	Level 1*	Continue monitoring program	
Registered Bores:	 Increase in water flow from the goaf between 2.7 to 3 ML/day (over 20 day average) 	 Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers 	
GW 34425	 5.0 – 7.5 m reduction in the Hawkesbury Sandstone greater than predicted elements where level or preserve (article of pumping) 	Report in the End of Panel Report	
GW 35033	predicted standing water level or pressure (outside of pumping influences in private bores) over a minimum 2 month period	 Summarise actions and monitoring in AEMR 	
GW 72249			
GW 100673	Level 2*	Actions stated for Level 1	
GW 101133	Increase in water flow from the goaf between 3 to 3.4ML (over 20	Review monitoring program	
GW 102043	day average)	 Notify relevant technical specialists and seek advice on any CMA required 	
GW 102584	 7.5 – 10 m reduction in the Hawkesbury Sandstone greater than predicted standing water level or pressure (outside of pumping 	Implement agreed CMAs as approved	
GW 102798	influences in private bores) over a minimum 2 month period	<u>Note</u> : CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. cracking at the	
GW 103161		surface with insignificant consequences may not require specific CMAs other	
GW 104068		than ongoing monitoring to confirm there are no ongoing impacts	
GW 104602	1		
GW 104661	Level 3*	Actions stated for Level 2 Notificial DBL NeW, DBE, relevant resource managem and technical	
GW 110671	 Abnormal increase in water flow from the goaf >3.4ML (20 day average) 	 Notify OEH, DP&I, DPI, NoW, DRE, relevant resource managers and technical specialists and seek advice on any CMA required. 	
011100/1	 >10m reduction in the Hawkesbury Sandstone standing water level 	Invite stakeholders for site visit	
BHPBIC Piezometers:	or pressure (outside of pumping influences in private bores) over a minimum 2 month period	Develop site CMA (subject to stakeholder feedback). This may include:	
EAW9	Mining results in groundwater bores unsafe, unserviceable or	 Make area safe 	
EAW18	damaged	 Any actions agreed to in the Property Subsidence Management Plan Descriptions of alternative supplications that have been invested by 	
EAW58		 Provisions of alternate water supply where this has been impacted by mining 	
PROSPA		 MSB to repair any infrastructure damaged by mining 	
PROSP B		 Completion of works following approvals, including monitoring and reporting on success 	
		 Review the Groundwater Model, TARP and Management Plan in consultation with key stakeholders 	
		<u>Note</u> : CMAs are to be proposed based on appropriate management of environmental and other consequences of mining impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts	