

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 12<sup>th</sup> May 2018 and, as of the 17<sup>th</sup> July 2018, had progressed approximately 431 m.

During the latest inspection of the Nepean River, on the 16<sup>th</sup> 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 16<sup>th</sup> July 2018.

#### **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: 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.**

<b>Site</b>	<b>Identification Date</b>	<b>Activating Longwall</b>	<b>Type</b>	<b>Trigger Level</b>	<b>Comment</b>	<b>Activity on Last Inspection</b>
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
<b>AA9_LW902_001</b>	<b>18/07/2018</b>	<b>LW902</b>	<b>Gas Zone</b>	<b>Level 1</b>	<b>Gas Zone in Nepean River</b>	<b>Active</b>

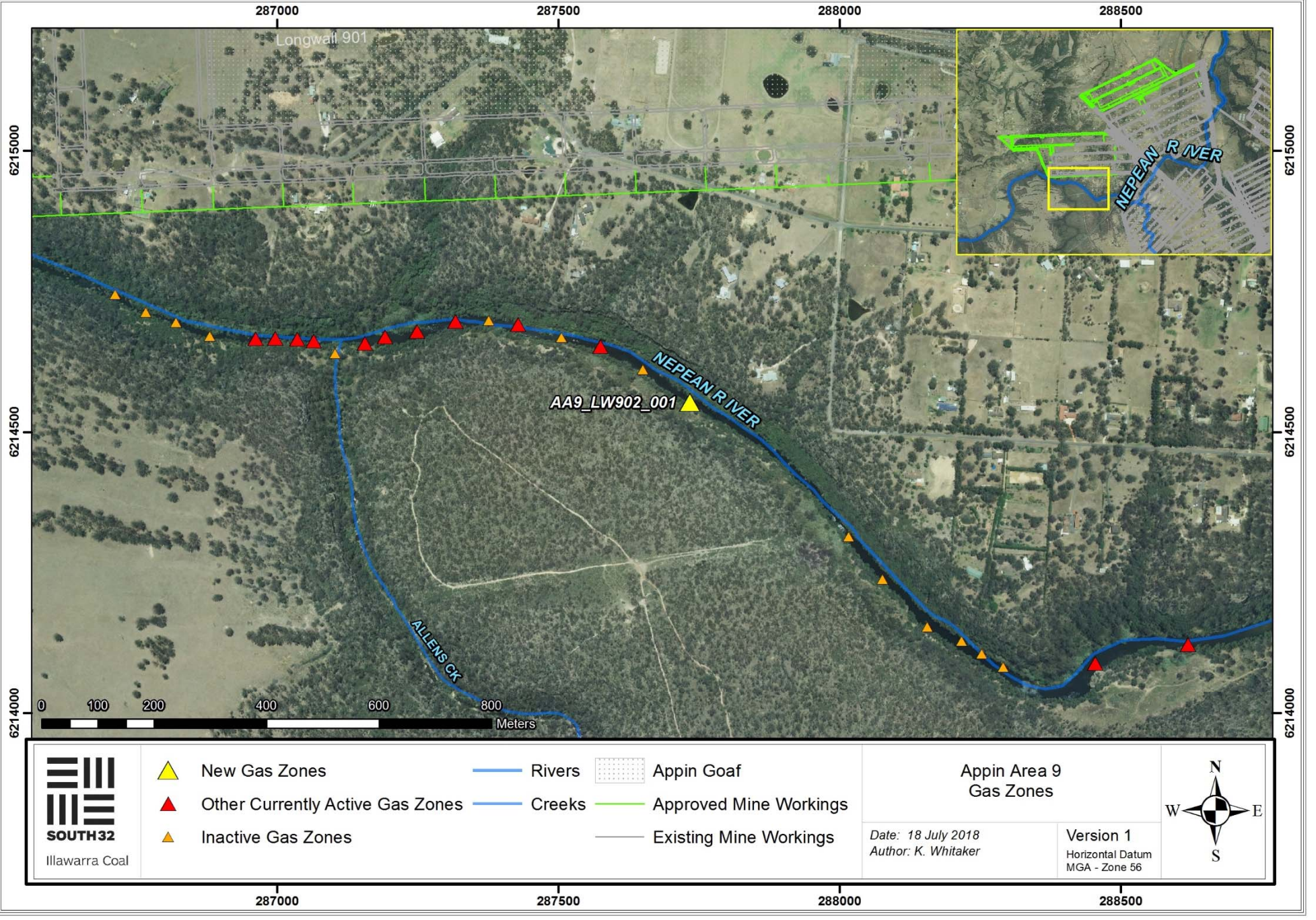


Figure 1: Status of gas release zones in Appin Area 9 in reference to the latest inspection.

APPENDIX A

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

Monitoring	Trigger	Action
<b>WATER QUALITY</b>		
<p>Adjacent and downstream sites:</p> <ul style="list-style-type: none"> <li>• Nepean River:               <ul style="list-style-type: none"> <li>– NR0</li> <li>– SW3 (NR1)</li> <li>– NR2</li> <li>– If and where strata gas emission plumes above 3000 L/min are detected</li> </ul> </li> </ul>	<p><b>Level 1*</b></p> <p>Impact monitoring sites when comparing the baseline period to the mining period for that site:</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• 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</li> <li>• Identification of strata gas plume of flow rate &lt; 3000 L/min</li> </ul>	<ul style="list-style-type: none"> <li>• Continue monitoring program</li> <li>• Submit an Impact Report to OEHL, DoPI, DPI and other relevant resource managers</li> <li>• Report in the End of Panel Report</li> <li>• Summarise actions and monitoring in AEMR</li> </ul>
	<p><b>Level 2*</b></p> <p>Impact monitoring sites when comparing the baseline period to the mining period for that site:</p> <ul style="list-style-type: none"> <li>• pH reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• EC, total Fe and total Mn increases greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• Identification of strata gas plume of flow rate &gt;3000 L/min</li> </ul>	<ul style="list-style-type: none"> <li>• Actions stated for Level 1</li> <li>• Review monitoring program</li> <li>• Notify relevant technical specialists and seek advice on any CMA required</li> <li>• Implement agreed CMAs as approved</li> </ul> <p><i>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</i></p> <p><i>Strata Gas Emission Plume:</i></p> <ul style="list-style-type: none"> <li>• Estimate gas emission flow rates. Re-estimate should significant change be observed</li> <li>• Take sample of plume (if possible) for:               <ul style="list-style-type: none"> <li>– chemical composition</li> <li>– dissolved methane from exactly above gas plume and at established downriver monitoring site</li> <li>– dissolved sulfide and total phenols from exactly above gas plume and at nearest downriver monitoring site</li> </ul> </li> </ul>
	<p><b>Level 3*</b></p> <p>Impact monitoring sites when comparing the baseline period to the mining period for that site:</p> <ul style="list-style-type: none"> <li>• Level 2-type reduction in water quality resulting from the mining observed for more than 6 consecutive months</li> </ul>	<ul style="list-style-type: none"> <li>• Actions stated for Level 2</li> <li>• Notify OEHL, DP&amp;I, NoW, DPI, DRE, relevant resource managers and technical specialists and seek advice on any CMA required</li> <li>• Invite stakeholders for site visit</li> <li>• Develop site CMA (subject to stakeholder feedback)</li> <li>• Completion of works following approvals, including monitoring and reporting on success</li> <li>• Review the TARP and Management Plan in consultation with key stakeholders</li> </ul> <p><i>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</i></p>

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 12<sup>th</sup> May 2018 and, as of the 17<sup>th</sup> July 2018 had progressed approximately 760 m.

During the latest inspection of the Nepean River, on 4<sup>th</sup> 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 m<sup>2</sup> (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.

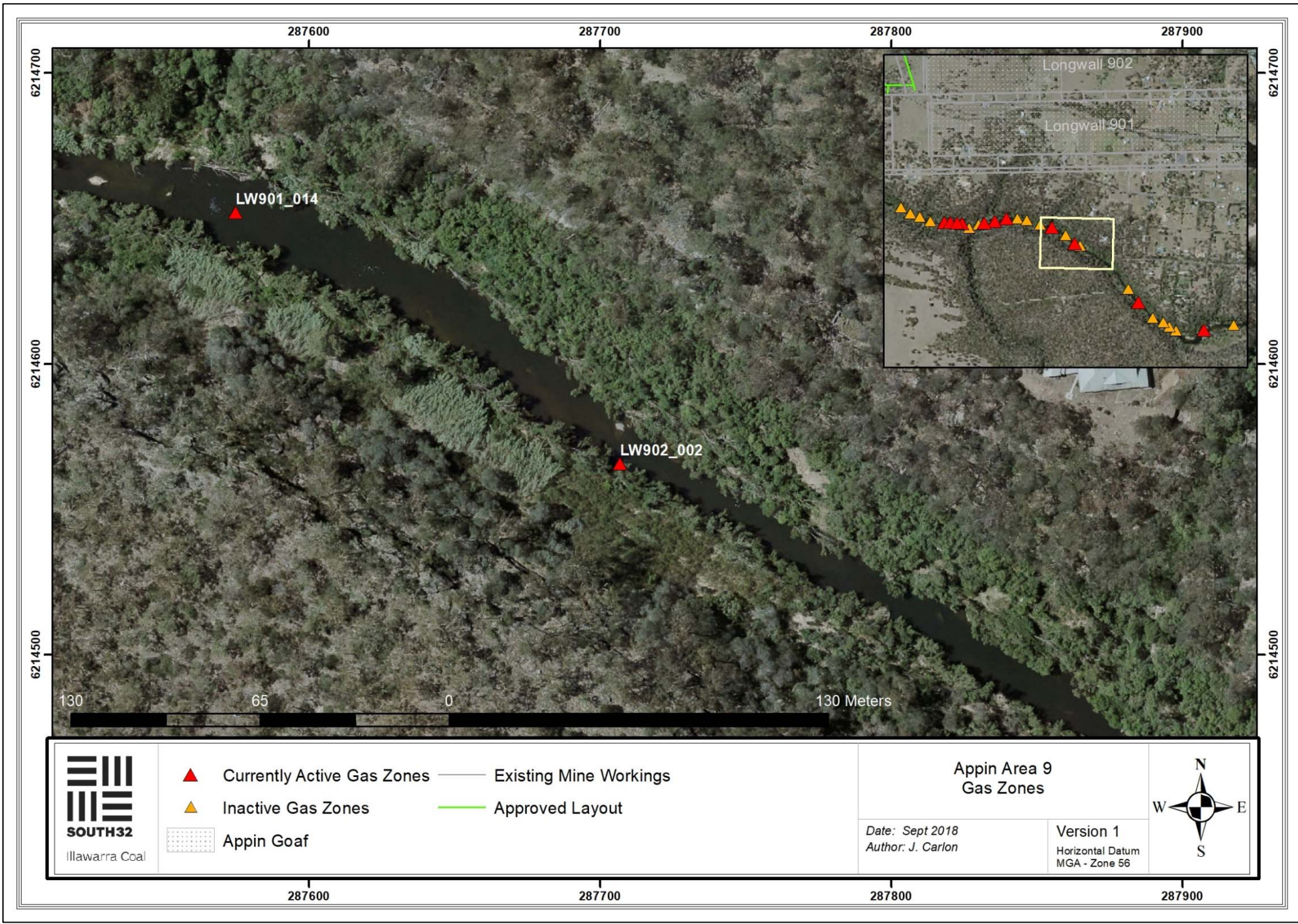
#### **Corrective Management Actions (CMAs)**







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

Site	Identification Date	Activating Longwall	Type	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



 SOUTH32 Illawarra Coal	 Currently Active Gas Zones	 Existing Mine Workings
	 Inactive Gas Zones	 Approved Layout
 Appin Goaf		

**Appin Area 9  
Gas Zones**

*Date: Sept 2018*  
*Author: J. Carlon*

Version 1  
Horizontal Datum  
MGA - Zone 56

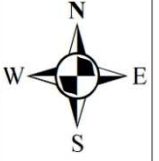


Figure 1: Status of gas release zones in Appin Area 9.

APPENDIX A

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

Monitoring	Trigger	Action
<b>WATER QUALITY</b>		
<p>Adjacent and downstream sites:</p> <ul style="list-style-type: none"> <li>• Nepean River:               <ul style="list-style-type: none"> <li>– NR0</li> <li>– SW3 (NR1)</li> <li>– NR2</li> <li>– If and where strata gas emission plumes above 3000 L/min are detected</li> </ul> </li> </ul>	<p><b>Level 1*</b></p> <p>Impact monitoring sites when comparing the baseline period to the mining period for that site:</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• 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</li> <li>• Identification of strata gas plume of flow rate &lt; 3000 L/min</li> </ul>	<ul style="list-style-type: none"> <li>• Continue monitoring program</li> <li>• Submit an Impact Report to OEHL, DoPI, DPI and other relevant resource managers</li> <li>• Report in the End of Panel Report</li> <li>• Summarise actions and monitoring in AEMR</li> </ul>
	<p><b>Level 2*</b></p> <p>Impact monitoring sites when comparing the baseline period to the mining period for that site:</p> <ul style="list-style-type: none"> <li>• pH reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• EC, total Fe and total Mn increases greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• Identification of strata gas plume of flow rate &gt;3000 L/min</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Actions stated for Level 1</i></li> <li>• Review monitoring program</li> <li>• Notify relevant technical specialists and seek advice on any CMA required</li> <li>• Implement agreed CMAs as approved</li> </ul> <p><i>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</i></p> <p><i>Strata Gas Emission Plume:</i></p> <ul style="list-style-type: none"> <li>• Estimate gas emission flow rates. Re-estimate should significant change be observed</li> <li>• Take sample of plume (if possible) for:               <ul style="list-style-type: none"> <li>– chemical composition</li> <li>– dissolved methane from exactly above gas plume and at established downriver monitoring site</li> <li>– dissolved sulfide and total phenols from exactly above gas plume and at nearest downriver monitoring site</li> </ul> </li> </ul>
	<p><b>Level 3*</b></p> <p>Impact monitoring sites when comparing the baseline period to the mining period for that site:</p> <ul style="list-style-type: none"> <li>• Level 2-type reduction in water quality resulting from the mining observed for more than 6 consecutive months</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Actions stated for Level 2</i></li> <li>• Notify OEHL, DP&amp;I, NoW, DPI, DRE, relevant resource managers and technical specialists and seek advice on any CMA required</li> <li>• Invite stakeholders for site visit</li> <li>• Develop site CMA (subject to stakeholder feedback)</li> <li>• Completion of works following approvals, including monitoring and reporting on success</li> <li>• Review the TARP and Management Plan in consultation with key stakeholders</li> </ul> <p><i>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</i></p>

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 5m<sup>2</sup> (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)**

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: 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	Type	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
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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
AA9_LW902_003	29/01/2019	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active

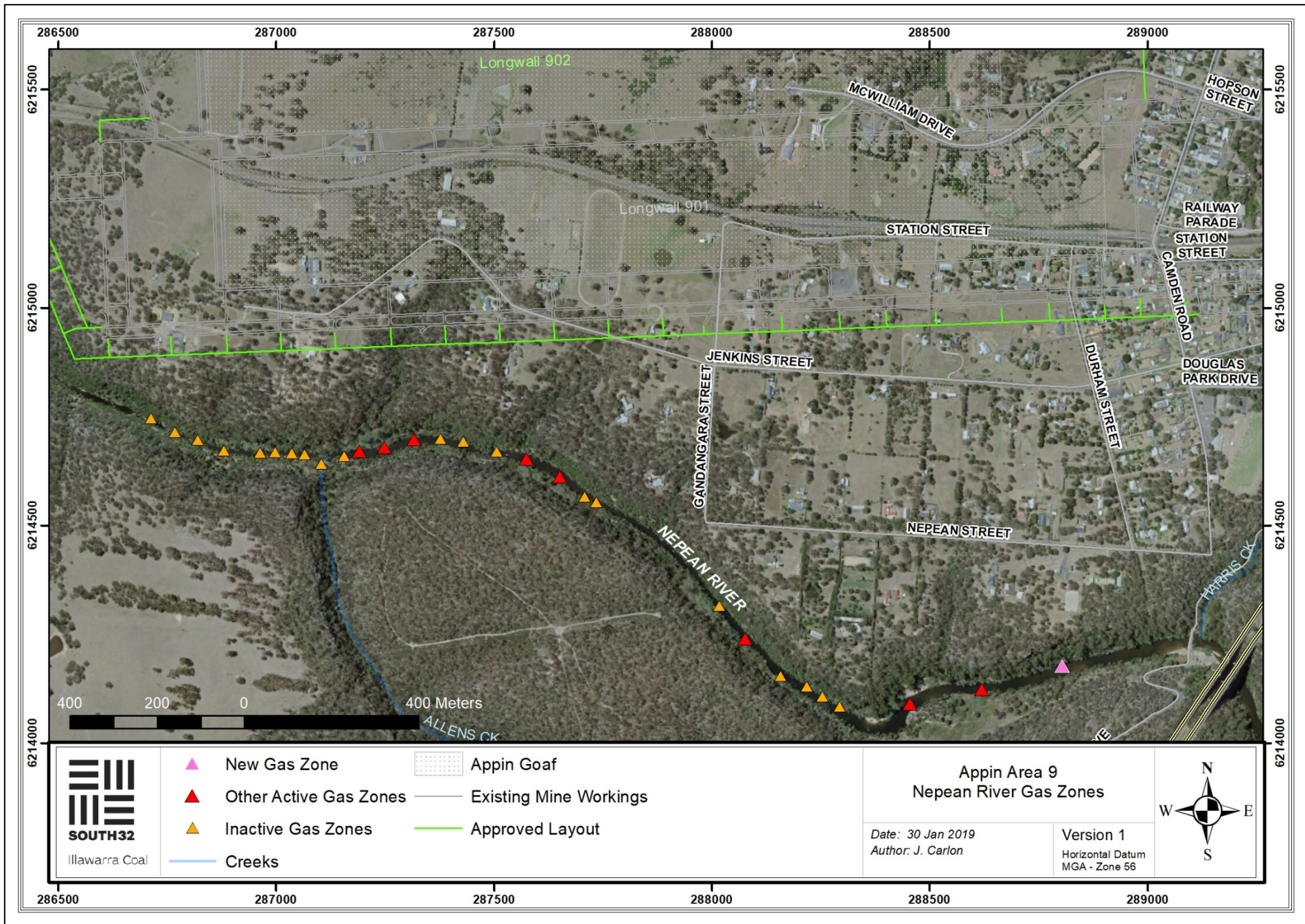


Figure 1: Nepean River gas release zones in relation to Appin Area 9.

**APPENDIX A**

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

Monitoring	Trigger	Action
<b>WATER QUALITY</b>		
<p>Adjacent and downstream sites:</p> <ul style="list-style-type: none"> <li>• Nepean River:               <ul style="list-style-type: none"> <li>– NR0</li> <li>– SW3 (NR1)</li> <li>– NR2</li> <li>– If and where strata gas emission plumes above 3000 L/min are detected</li> </ul> </li> </ul>	<p><b>Level 1*</b></p> <p>Impact monitoring sites when comparing the baseline period to the mining period for that site:</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• 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</li> <li>• Identification of strata gas plume of flow rate &lt; 3000 L/min</li> </ul>	<ul style="list-style-type: none"> <li>• Continue monitoring program</li> <li>• Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers</li> <li>• Report in the End of Panel Report</li> <li>• Summarise actions and monitoring in AEMR</li> </ul>
	<p><b>Level 2*</b></p> <p>Impact monitoring sites when comparing the baseline period to the mining period for that site:</p> <ul style="list-style-type: none"> <li>• pH reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• EC, total Fe and total Mn increases greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• Identification of strata gas plume of flow rate &gt;3000 L/min</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Actions stated for Level 1</i></li> <li>• Review monitoring program</li> <li>• Notify relevant technical specialists and seek advice on any CMA required</li> <li>• Implement agreed CMAs as approved</li> </ul> <p><i>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</i></p> <p><i>Strata Gas Emission Plume:</i></p> <ul style="list-style-type: none"> <li>• Estimate gas emission flow rates. Re-estimate should significant change be observed</li> <li>• Take sample of plume (if possible) for:               <ul style="list-style-type: none"> <li>– chemical composition</li> <li>– dissolved methane from exactly above gas plume and at established downriver monitoring site</li> <li>– dissolved sulfide and total phenols from exactly above gas plume and at nearest downriver monitoring site</li> </ul> </li> </ul>
	<p><b>Level 3*</b></p> <p>Impact monitoring sites when comparing the baseline period to the mining period for that site:</p> <ul style="list-style-type: none"> <li>• Level 2-type reduction in water quality resulting from the mining observed for more than 6 consecutive months</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Actions stated for Level 2</i></li> <li>• Notify OEH, DP&amp;I, NoW, DPI, DRE, relevant resource managers and technical specialists and seek advice on any CMA required</li> <li>• Invite stakeholders for site visit</li> <li>• Develop site CMA (subject to stakeholder feedback)</li> <li>• Completion of works following approvals, including monitoring and reporting on success</li> <li>• Review the TARP and Management Plan in consultation with key stakeholders</li> </ul> <p><i>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</i></p>

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 5m<sup>2</sup> (**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.

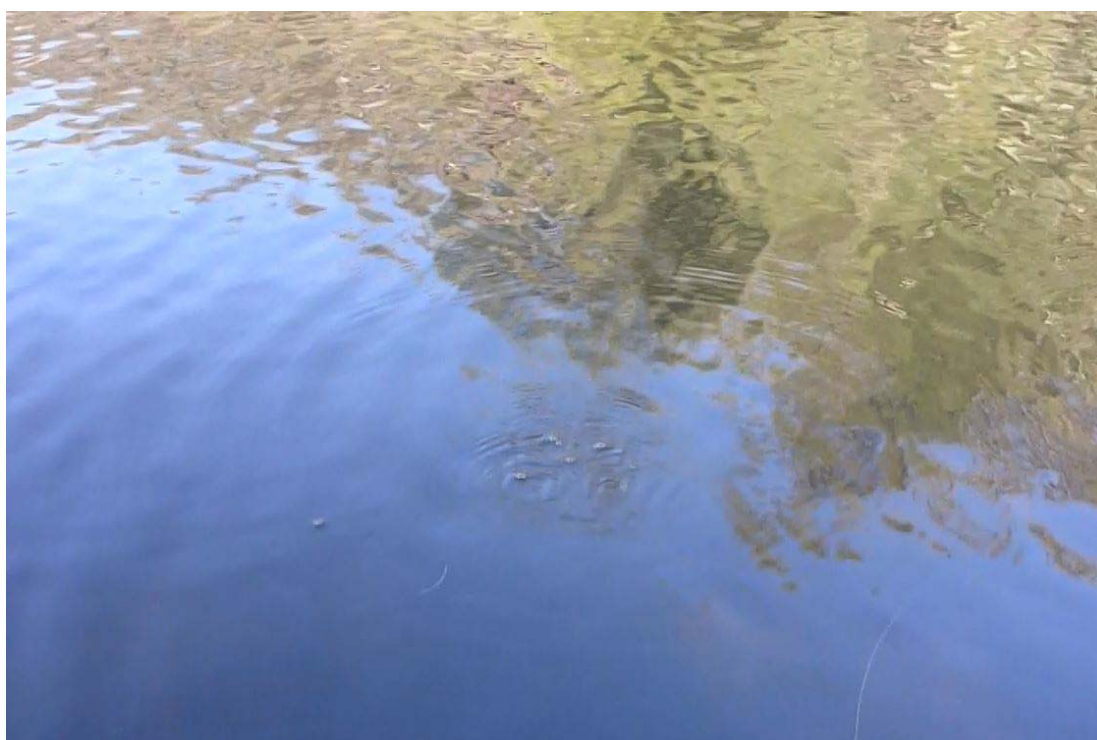


Photo 1: Gas release zone *AA9\_LW902\_004* on the Nepean River. Taken on 26/04/2019.

**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)**

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 26 April 2019.

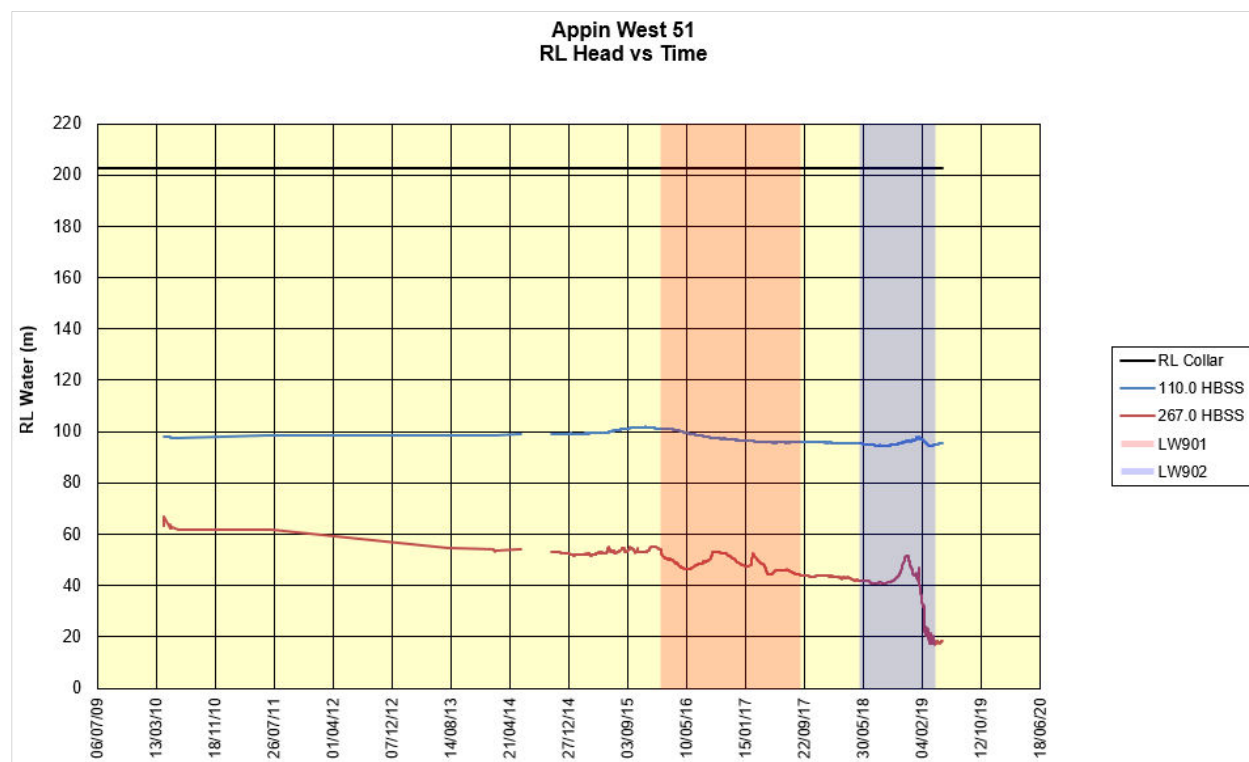
Site	Identification Date	Activating Longwall	Type	Trigger Level	Comment	Activity on Last Inspection
AA9_LW902_001	18/07/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Inactive
AA9_LW902_002	4/09/2018	LW902	Gas Zone	Level 1	Gas Zone in Nepean River	Active
AA9_LW902_003	29/01/2019	LW902	Gas Zone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



Graph 1: Groundwater levels recorded in the Hawkesbury Sandstone (HBSS) in borehole S2060 (Appin West 51).

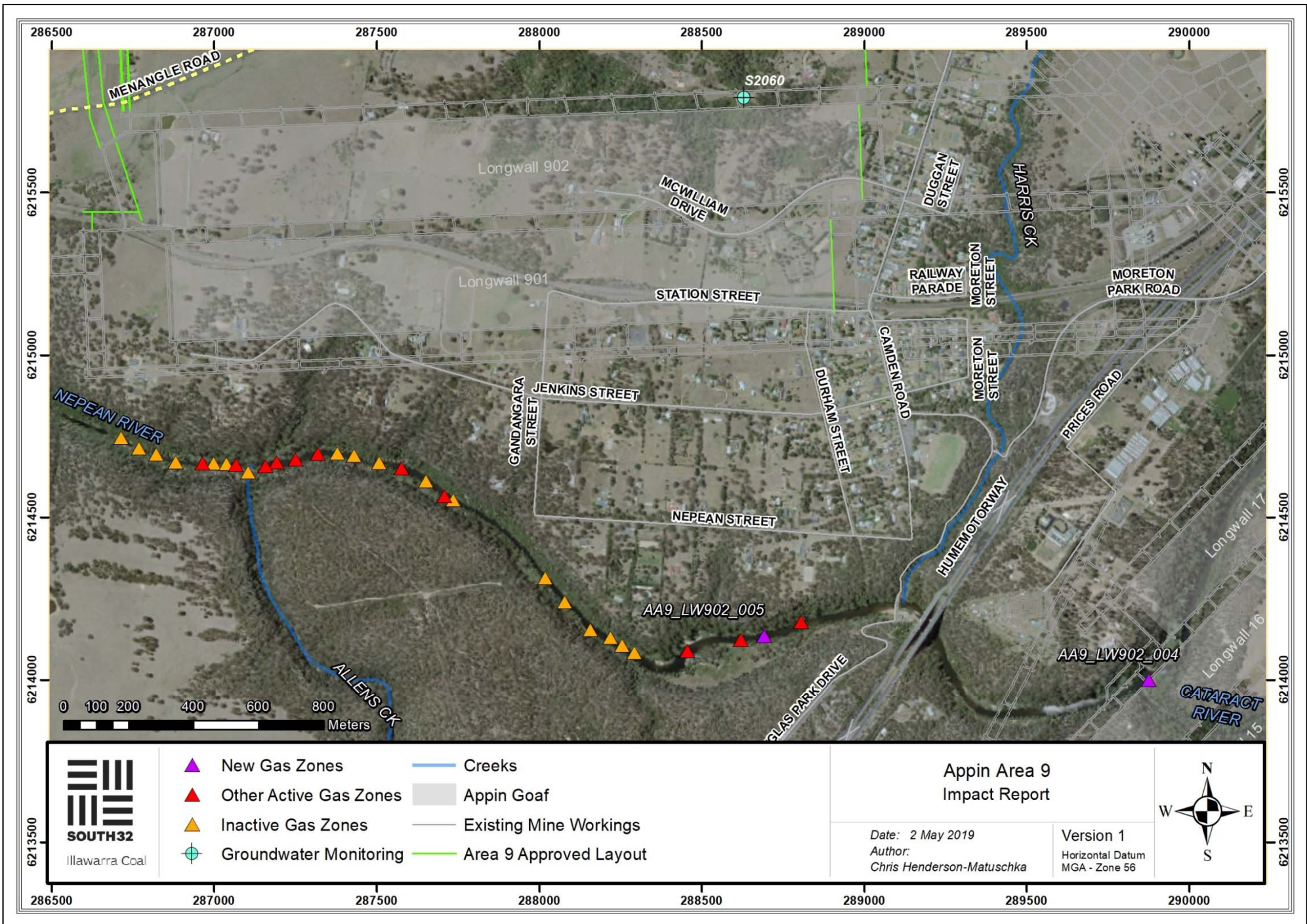


Figure 1: Subsidence impacts and monitoring in relation to Appin Area 9.

APPENDIX A

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

Monitoring	Trigger	Action
<b>WATER QUALITY</b>		
Adjacent and downstream sites: <ul style="list-style-type: none"> <li>• Nepean River:               <ul style="list-style-type: none"> <li>- NR0</li> <li>- SW3 (NR1)</li> <li>- NR2</li> <li>- If and where strata gas emission plumes above 3000 L/min are detected</li> </ul> </li> </ul>	<b>Level 1*</b> Impact monitoring sites when comparing the baseline period to the mining period for that site: <ul style="list-style-type: none"> <li>• 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</li> <li>• 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</li> <li>• Identification of strata gas plume of flow rate &lt; 3000 L/min</li> </ul>	<ul style="list-style-type: none"> <li>• Continue monitoring program</li> <li>• Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers</li> <li>• Report in the End of Panel Report</li> <li>• Summarise actions and monitoring in AEMR</li> </ul>
	<b>Level 2*</b> Impact monitoring sites when comparing the baseline period to the mining period for that site: <ul style="list-style-type: none"> <li>• pH reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• EC, total Fe and total Mn increases greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• Identification of strata gas plume of flow rate &gt;3000 L/min</li> </ul>	<ul style="list-style-type: none"> <li>• Actions stated for Level 1</li> <li>• Review monitoring program</li> <li>• Notify relevant technical specialists and seek advice on any CMA required</li> <li>• Implement agreed CMAs as approved</li> </ul> <p><i>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</i></p> <p><i>Strata Gas Emission Plume:</i></p> <ul style="list-style-type: none"> <li>• Estimate gas emission flow rates. Re-estimate should significant change be observed</li> <li>• Take sample of plume (if possible) for:               <ul style="list-style-type: none"> <li>- chemical composition</li> <li>- dissolved methane from exactly above gas plume and at established downriver monitoring site</li> <li>- dissolved sulfide and total phenols from exactly above gas plume and at nearest downriver monitoring site</li> </ul> </li> </ul>
	<b>Level 3*</b> Impact monitoring sites when comparing the baseline period to the mining period for that site: <ul style="list-style-type: none"> <li>• Level 2-type reduction in water quality resulting from the mining observed for more than 6 consecutive months</li> </ul>	<ul style="list-style-type: none"> <li>• Actions stated for Level 2</li> <li>• Notify OEH, DP&amp;I, NoW, DPI, DRE, relevant resource managers and technical specialists and seek advice on any CMA required</li> <li>• Invite stakeholders for site visit</li> <li>• Develop site CMA (subject to stakeholder feedback)</li> <li>• Completion of works following approvals, including monitoring and reporting on success</li> <li>• Review the TARP and Management Plan in consultation with key stakeholders</li> </ul> <p><i>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</i></p>

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	Type	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

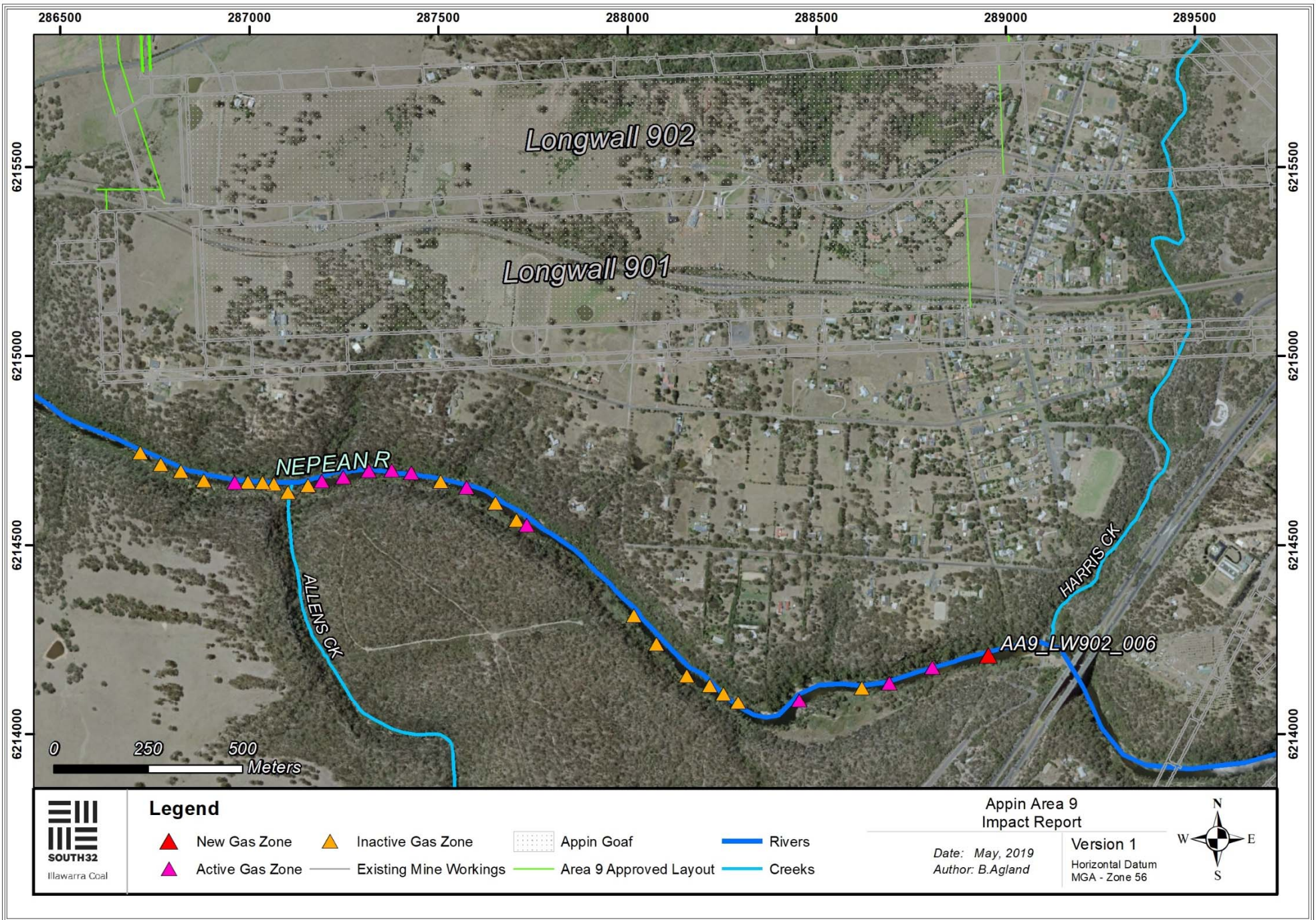


Figure 1: Subsidence impacts and monitoring in relation to Appin Area 9.

APPENDIX A

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

Monitoring	Trigger	Action
<b>WATER QUALITY</b>		
<p>Adjacent and downstream sites:</p> <ul style="list-style-type: none"> <li>• Nepean River:               <ul style="list-style-type: none"> <li>- NR0</li> <li>- SW3 (NR1)</li> <li>- NR2</li> <li>- If and where strata gas emission plumes above 3000 L/min are detected</li> </ul> </li> </ul>	<p><b>Level 1*</b></p> <p>Impact monitoring sites when comparing the baseline period to the mining period for that site:</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• 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</li> <li>• Identification of strata gas plume of flow rate &lt; 3000 L/min</li> </ul>	<ul style="list-style-type: none"> <li>• Continue monitoring program</li> <li>• Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers</li> <li>• Report in the End of Panel Report</li> <li>• Summarise actions and monitoring in AEMR</li> </ul>
	<p><b>Level 2*</b></p> <p>Impact monitoring sites when comparing the baseline period to the mining period for that site:</p> <ul style="list-style-type: none"> <li>• pH reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• EC, total Fe and total Mn increases greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• Identification of strata gas plume of flow rate &gt;3000 L/min</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Actions stated for Level 1</i></li> <li>• Review monitoring program</li> <li>• Notify relevant technical specialists and seek advice on any CMA required</li> <li>• Implement agreed CMAs as approved</li> </ul> <p><i>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</i></p> <p><i>Strata Gas Emission Plume:</i></p> <ul style="list-style-type: none"> <li>• Estimate gas emission flow rates. Re-estimate should significant change be observed</li> <li>• Take sample of plume (if possible) for:               <ul style="list-style-type: none"> <li>- chemical composition</li> <li>- dissolved methane from exactly above gas plume and at established downriver monitoring site</li> <li>- dissolved sulfide and total phenols from exactly above gas plume and at nearest downriver monitoring site</li> </ul> </li> </ul>
	<p><b>Level 3*</b></p> <p>Impact monitoring sites when comparing the baseline period to the mining period for that site:</p> <ul style="list-style-type: none"> <li>• Level 2-type reduction in water quality resulting from the mining observed for more than 6 consecutive months</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Actions stated for Level 2</i></li> <li>• Notify OEH, DP&amp;I, NoW, DPI, DRE, relevant resource managers and technical specialists and seek advice on any CMA required</li> <li>• Invite stakeholders for site visit</li> <li>• Develop site CMA (subject to stakeholder feedback)</li> <li>• Completion of works following approvals, including monitoring and reporting on success</li> <li>• Review the TARP and Management Plan in consultation with key stakeholders</li> </ul> <p><i>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</i></p>

Monitoring	Trigger	Action
	<p><b>Exceeding Performance Measures</b></p> <ul style="list-style-type: none"> <li>Mining results in more than negligible gas releases, iron staining or water cloudiness</li> </ul>	<ul style="list-style-type: none"> <li>Actions stated for Level 3</li> <li>Investigate reasons for the exceedance</li> <li>Update future predictions based on the outcomes of the investigation</li> <li>Provide environmental offset if CMAs are unsuccessful</li> </ul>
<b>GROUNDWATER</b>		
<p><b>Groundwater flow into the mine</b></p> <p><b>Registered Bores:</b></p> <p>GW 34425  GW 35033  GW 72249  GW 100673  GW 101133  GW 102043  GW 102584  GW 102798  GW 103161  GW 104068  GW 104602  GW 104661  GW 110671</p> <p><b>BHPBIC Piezometers:</b></p> <p>EAW9  EAW18  EAW58  PROSP A  PROSP B</p>	<p><b>Level 1*</b></p> <ul style="list-style-type: none"> <li>Increase in water flow from the goaf between 2.7 to 3 ML/day (over 20 day average)</li> <li>5.0 – 7.5 m reduction in the Hawkesbury Sandstone greater than predicted standing water level or pressure (outside of pumping influences in private bores) over a minimum 2 month period</li> </ul> <p><b>Level 2*</b></p> <ul style="list-style-type: none"> <li>Increase in water flow from the goaf between 3 to 3.4ML (over 20 day average)</li> <li>7.5 – 10 m reduction in the Hawkesbury Sandstone greater than predicted standing water level or pressure (outside of pumping influences in private bores) over a minimum 2 month period</li> </ul> <p><b>Level 3*</b></p> <ul style="list-style-type: none"> <li>Abnormal increase in water flow from the goaf &gt;3.4ML (20 day average)</li> <li>&gt;10m reduction in the Hawkesbury Sandstone standing water level or pressure (outside of pumping influences in private bores) over a minimum 2 month period</li> <li>Mining results in groundwater bores unsafe, unserviceable or damaged</li> </ul>	<ul style="list-style-type: none"> <li>Continue monitoring program</li> <li>Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers</li> <li>Report in the End of Panel Report</li> <li>Summarise actions and monitoring in AEMR</li> </ul> <p><i>Actions stated for Level 1</i></p> <ul style="list-style-type: none"> <li>Review monitoring program</li> <li>Notify relevant technical specialists and seek advice on any CMA required</li> <li>Implement agreed CMAs as approved</li> </ul> <p><i>Note: 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</i></p> <ul style="list-style-type: none"> <li>Actions stated for Level 2</li> <li>Notify OEH, DP&amp;I, DPI, NoW, DRE, relevant resource managers and technical specialists and seek advice on any CMA required.</li> <li>Invite stakeholders for site visit</li> <li>Develop site CMA (subject to stakeholder feedback). This may include: <ul style="list-style-type: none"> <li>Make area safe</li> <li>Any actions agreed to in the Property Subsidence Management Plan</li> <li>Provisions of alternate water supply where this has been impacted by mining</li> <li>MSB to repair any infrastructure damaged by mining</li> </ul> </li> <li>Completion of works following approvals, including monitoring and reporting on success</li> <li>Review the Groundwater Model, TARP and Management Plan in consultation with key stakeholders</li> </ul> <p><i>Note: 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</i></p>

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	Type	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

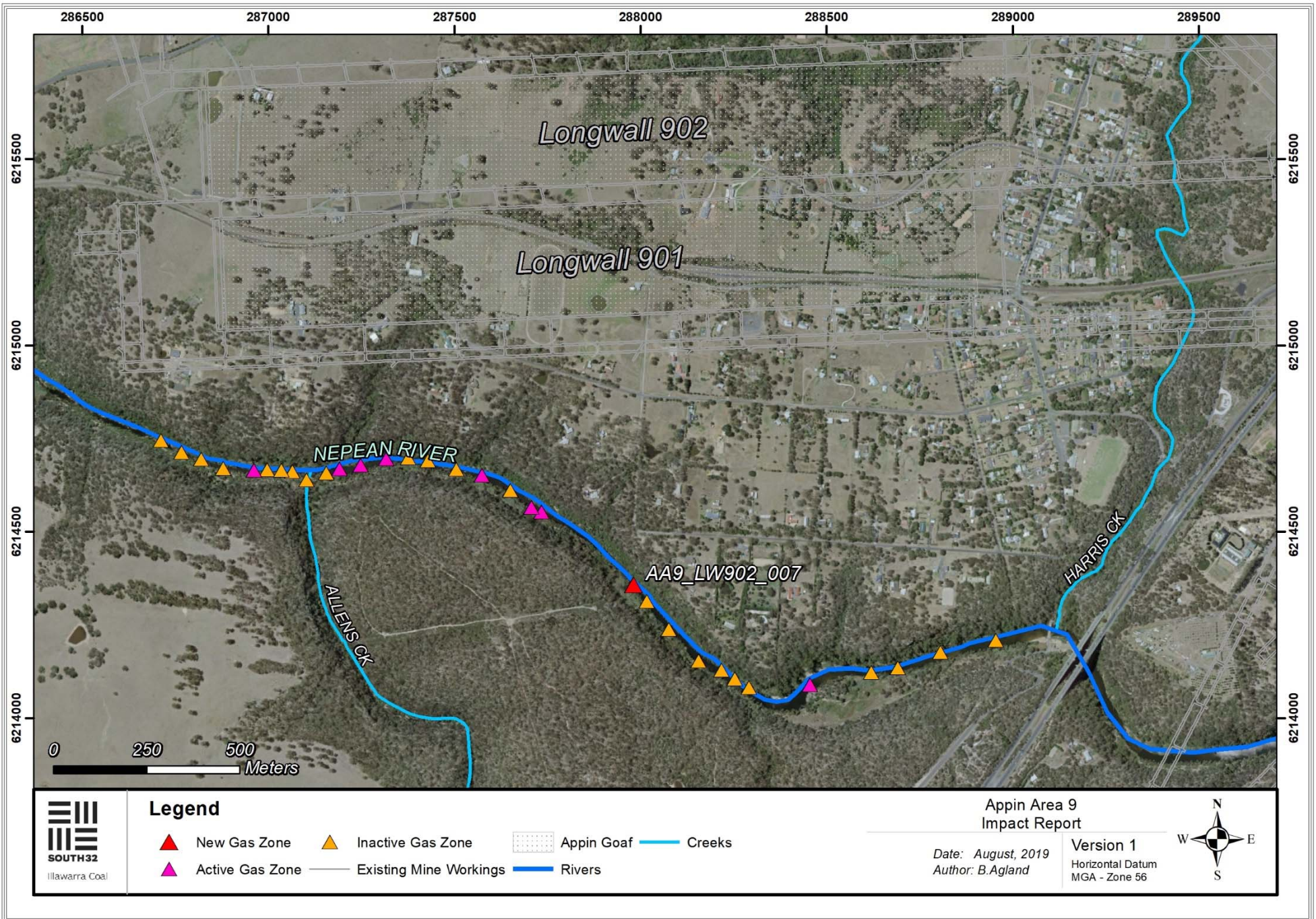


Figure 1: Subsidence impacts and monitoring in relation to Appin Area 9.

APPENDIX A

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

Monitoring	Trigger	Action
<b>WATER QUALITY</b>		
Adjacent and downstream sites: <ul style="list-style-type: none"> <li>• Nepean River:               <ul style="list-style-type: none"> <li>- NR0</li> <li>- SW3 (NR1)</li> <li>- NR2</li> <li>- If and where strata gas emission plumes above 3000 L/min are detected</li> </ul> </li> </ul>	<b>Level 1*</b> Impact monitoring sites when comparing the baseline period to the mining period for that site: <ul style="list-style-type: none"> <li>• 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</li> <li>• 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</li> <li>• Identification of strata gas plume of flow rate &lt; 3000 L/min</li> </ul>	<ul style="list-style-type: none"> <li>• Continue monitoring program</li> <li>• Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers</li> <li>• Report in the End of Panel Report</li> <li>• Summarise actions and monitoring in AEMR</li> </ul>
	<b>Level 2*</b> Impact monitoring sites when comparing the baseline period to the mining period for that site: <ul style="list-style-type: none"> <li>• pH reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• DO reduction greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• EC, total Fe and total Mn increases greater than 2 standard deviation from pre-mining mean resulting from the mining for two consecutive months</li> <li>• Identification of strata gas plume of flow rate &gt;3000 L/min</li> </ul>	<ul style="list-style-type: none"> <li>• Actions stated for Level 1</li> <li>• Review monitoring program</li> <li>• Notify relevant technical specialists and seek advice on any CMA required</li> <li>• Implement agreed CMAs as approved</li> </ul> <p><i>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</i></p> <p><i>Strata Gas Emission Plume:</i></p> <ul style="list-style-type: none"> <li>• Estimate gas emission flow rates. Re-estimate should significant change be observed</li> <li>• Take sample of plume (if possible) for:               <ul style="list-style-type: none"> <li>- chemical composition</li> <li>- dissolved methane from exactly above gas plume and at established downriver monitoring site</li> <li>- dissolved sulfide and total phenols from exactly above gas plume and at nearest downriver monitoring site</li> </ul> </li> </ul>
	<b>Level 3*</b> Impact monitoring sites when comparing the baseline period to the mining period for that site: <ul style="list-style-type: none"> <li>• Level 2-type reduction in water quality resulting from the mining observed for more than 6 consecutive months</li> </ul>	<ul style="list-style-type: none"> <li>• Actions stated for Level 2</li> <li>• Notify OEH, DP&amp;I, NoW, DPI, DRE, relevant resource managers and technical specialists and seek advice on any CMA required</li> <li>• Invite stakeholders for site visit</li> <li>• Develop site CMA (subject to stakeholder feedback)</li> <li>• Completion of works following approvals, including monitoring and reporting on success</li> <li>• Review the TARP and Management Plan in consultation with key stakeholders</li> </ul> <p><i>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</i></p>

Monitoring	Trigger	Action
	<p><b>Exceeding Performance Measures</b></p> <ul style="list-style-type: none"> <li>Mining results in more than negligible gas releases, iron staining or water cloudiness</li> </ul>	<ul style="list-style-type: none"> <li>Actions stated for Level 3</li> <li>Investigate reasons for the exceedance</li> <li>Update future predictions based on the outcomes of the investigation</li> <li>Provide environmental offset if CMAs are unsuccessful</li> </ul>
<b>GROUNDWATER</b>		
<p><b>Groundwater flow into the mine</b></p> <p><b>Registered Bores:</b></p> <p>GW 34425 GW 35033 GW 72249 GW 100673 GW 101133 GW 102043 GW 102584 GW 102798 GW 103161 GW 104068 GW 104602 GW 104661 GW 110671</p> <p><b>BHPBIC Piezometers:</b></p> <p>EAW9 EAW18 EAW58 PROSP A PROSP B</p>	<p><b>Level 1*</b></p> <ul style="list-style-type: none"> <li>Increase in water flow from the goaf between 2.7 to 3 ML/day (over 20 day average)</li> <li>5.0 – 7.5 m reduction in the Hawkesbury Sandstone greater than predicted standing water level or pressure (outside of pumping influences in private bores) over a minimum 2 month period</li> </ul> <p><b>Level 2*</b></p> <ul style="list-style-type: none"> <li>Increase in water flow from the goaf between 3 to 3.4ML (over 20 day average)</li> <li>7.5 – 10 m reduction in the Hawkesbury Sandstone greater than predicted standing water level or pressure (outside of pumping influences in private bores) over a minimum 2 month period</li> </ul> <p><b>Level 3*</b></p> <ul style="list-style-type: none"> <li>Abnormal increase in water flow from the goaf &gt;3.4ML (20 day average)</li> <li>&gt;10m reduction in the Hawkesbury Sandstone standing water level or pressure (outside of pumping influences in private bores) over a minimum 2 month period</li> <li>Mining results in groundwater bores unsafe, unserviceable or damaged</li> </ul>	<ul style="list-style-type: none"> <li>Continue monitoring program</li> <li>Submit an Impact Report to OEH, DoPI, DPI and other relevant resource managers</li> <li>Report in the End of Panel Report</li> <li>Summarise actions and monitoring in AEMR</li> </ul> <p><i>Actions stated for Level 1</i></p> <ul style="list-style-type: none"> <li>Review monitoring program</li> <li>Notify relevant technical specialists and seek advice on any CMA required</li> <li>Implement agreed CMAs as approved</li> </ul> <p><i>Note: 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</i></p> <ul style="list-style-type: none"> <li>Actions stated for Level 2</li> <li>Notify OEH, DP&amp;I, DPI, NoW, DRE, relevant resource managers and technical specialists and seek advice on any CMA required.</li> <li>Invite stakeholders for site visit</li> <li>Develop site CMA (subject to stakeholder feedback). This may include: <ul style="list-style-type: none"> <li>Make area safe</li> <li>Any actions agreed to in the Property Subsidence Management Plan</li> <li>Provisions of alternate water supply where this has been impacted by mining</li> <li>MSB to repair any infrastructure damaged by mining</li> </ul> </li> <li>Completion of works following approvals, including monitoring and reporting on success</li> <li>Review the Groundwater Model, TARP and Management Plan in consultation with key stakeholders</li> </ul> <p><i>Note: 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</i></p>