WATER MANAGEMENT PLAN TARP – WMP1 STREAM WATER QUALITY FOR ALL WATERCOURSES WITHIN THE SUBSIDENCE AREA[1]

Performance Measure and Indicator, TARP Objective and Assessment Criteria

Performance Measure Feature
All watercourses within the Subsidence Area[1].

Performance Measure
No greater subsidence impact or environmental consequences to water quality, water flows (including baseflow) or stream health (including riparian vegetation), than predicted in the EIS.

The EIS concludes that where the longwalls directly mine beneath the streams, it is considered likely that fracturing would result in surface water flow diversion and that localised and transient increases in water quality constituents would occur[2]. The performance measure will be considered to be exceeded if subsidence impacts cannot be repaired in a manner that restores pool water holding capacity and stream health. Remediation measures will be developed as required and detailed in the Watercourse Corrective Action Management Plan (C12 of the SSD 8445). These plans will contain relevant performance indicators specific to remediation performance measures.

Performance Indicator
Exceedance of the site specific guideline values (SSGVs), as defined in the Level 1 to Level 3 trigger, where a Level 3 trigger denotes progression towards a potential exceedance of the performance measure.

TARP Objective
This TARP defines levels of variation in surface water quality from normal conditions[3] and the actions required to be implemented in response to each level of variation.

Assessment Criteria
SSGV as listed in table below.

Monitoring Program

Locations

Longwall	Potential Impact Sites	Reference Sites
LW S1A	TT7-QLa TT12-QLa TT13-QLa TT14-QLa	TT1-QLa
LW S2A	TT9-QLa TT3-QLa[4] All sites above	
LW S3A	TT2-QLa All sites above	
LW S4A LW S5A LW S6A LW S7A	BR3-QLa TT1-QLa All sites above	DT4-QLa DT3-QLa

All monitoring locations are shown in Figure 19 of the Water Management Plan.

Monitoring Frequency

Pre-mining
Monthly sampling prior to secondary extraction of relevant longwall.

During Mining
Monthly sampling and analysis or as required by a specified action relevant to a trigger level.

Post-mining
Monthly sampling and analysis for a minimum of 12 months following the completion of LW S7A or as required in accordance with a Watercourse Corrective Action Management Plan.

Management

Trigger	Action	Response
Normal Condition		
• Exceedance of an SSGV does not occur or occurs for less than three consecutive months.	• Continue monitoring and review of data as per monitoring program.	• No response required.
Level 1		
• Exceedance of an SSGV occurs at a given potential impact site in three consecutive months and the same has not occurred at the reference site(s).	• *Actions as required for Normal Condition.* • Assess if the trigger was exceeded during the baseline period prior to commencement of mining activities. • Review water quality trends along watercourse (upstream to downstream) to identify spatial changes with consideration to climatic conditions. • Discuss findings with and obtain other relevant information from key specialists (e.g. subsidence monitoring results, groundwater quality monitoring results) necessary to inform assessment. • Consider and decide on reasonable and feasible options for remediation as relevant (e.g. limestone cobbles for increasing pH level).	• Report trigger exceedance to DPHI and key stakeholders. • Report trigger exceedance and investigation outcomes in Annual Review. • Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for consultation (e.g. limestone cobbles for increasing pH level). • Implement CMAs, subject to land access. • Monitor and report on success of CMAs in Annual Review.
Level 2		

• Exceedance of an SSGV occurs at a given potential impact site in four or five consecutive months and the same has not occurred at the reference site(s).	• *Actions as stated in Level 1.*
	• Consider increasing monitoring and review of data frequency at sites where Level 2 has been reached or at other relevant sites, subject to land access, as follows:
	  ○ Fortnightly, for sites within the active subsidence zone.
	  ○ Monthly, outside of the active subsidence period.
	Reasons for not increasing monitoring frequency could include confident identification of causation (e.g. singular, anthropogenic, non-mining related change or confirmed as a mining-related impact that resulted in a water quality change).
	• If increased monitoring is adopted, undertake further analysis of water quality trends along creek (upstream to downstream) to identify spatial changes with consideration to climatic conditions.
	• Review CMAs in light of findings from further investigations and consider additional remediation options.
	• Review Water Management Plan and modify if necessary.
		• *Responses as stated in Level 1.*
		• Advise DPHI and key stakeholders of any required amendments to Water Management Plan.
		• Provide findings of CMA review to DPHI and key stakeholders for consultation.
		• Implement additional CMAs, subject to land access.

Level 3		

• Exceedance of an SSGV occurs at a given potential impact site in six consecutive months and the same has not occurred at the reference site(s).	• *Actions as stated in Level 2.*
	• If mining related impact unconfirmed, increase monitoring and review of data frequency at sites where Level 3 has been reached or at other relevant sites, subject to land access, as follows:
	  ○ Fortnightly, for sites within the active subsidence zone.
	  ○ Monthly, outside of the active subsidence period.
	• Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing), other catchment changes, effects unrelated to mining or the prevailing climate.
		• *Responses as stated in Level 2.*
		If it is concluded from the detailed investigation that watercourses have been damaged by subsidence impacts:
		• Offer site visit with DPHI and other key stakeholders.
		• Develop Watercourse Corrective Action Management Plan (WCAMP) in consultation with the Resources Regulator, DPHI and other key stakeholders (in accordance with C12 of SSD 8445). The stream remediation measures in the WCAMP could include grout curtain and grout pattern injection.
		• Implement approved WCAMP, subject to land access.

Site Specific Guideline Value (SSGV)								
Parameter	**TT1-QLa**	**TT2-QLa**	**TT7-QLa**	**TT12-QLa**	**TT13-QLa**	**TT14-QLa**	**DT3**	**DT4**
No. of Values[5]	56	12	35	13	13	13	49	44
pH (pH units)	6.5 – 8	6 – 8	6.5 – 8	6.5 – 8	6.5 – 8	6.5 – 8	6.5 - 8	6.5 - 8
EC (µS/cm)	512	350	359	350	350	350	350	350
Dissolved Aluminium (mg/L) pH > 6.5	0.1	0.17	0.06	0.1	0.092	0.11	0.08	0.2
Dissolved Copper (mg/L)	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014
Dissolved Iron (mg/L)	0.76	0.55	0.81	0.64	0.47	0.57	0.48	0.60
Dissolved Manganese (mg/L)	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Dissolved Nickel (mg/L)	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011
Dissolved Zinc (mg/L)	0.03	0.02	0.03	0.008	0.008	0.008	0.008	0.008

Notes:
[1] Subsidence Area is defined as the 'Subsidence Study Area' as illustrated in Figure 1 of Appendix 2 of SSD 8445.
[2] Due to the predicted surface fracturing of watercourses which directly overlie the longwall panels.
[3] As defined by the site specific guideline value (SSGV).
[4] SSGVs have not been derived for TT3-QLa as the pool was dry on five of eight sampling occasions.
[5] Minimum number of values used in SSGV derivation – for some constituents, a greater number of values were adopted.

WATER MANAGEMENT PLAN TARP – WMP2 STREAM WATER QUALITY FOR OTHER WATERCOURSES (BARGO RIVER AND HORNES CREEK)

<table>
<tr><th rowspan="2">Performance Measure and Indicator, TARP Objective and Assessment Criteria</th><th rowspan="2">Monitoring Program</th><th colspan="3">Management</th></tr>
<tr><th>Trigger</th><th>Action</th><th>Response</th></tr>
<tr><td rowspan="8"><u>Performance Measure Feature</u>
Other watercourses.

<u>Performance Measure</u>
Negligible environmental consequences including beyond those predicted in the EIS.

<u>Performance Indicator</u>
The performance measure will be considered to be exceeded if a Level 3 TARP is triggered in relation to water quality changes and the investigation outcomes indicate a mining related impact based on monitoring data for sites in Hornes Creek and the Bargo River.

<u>TARP Objective</u>
This TARP defines levels of variation in surface water quality from normal conditions[1], indicators of exceedance of the performance measure and the actions required to be implemented in response to each level of variation or exceedance of the performance measure.

<u>Assessment Criteria</u>
SSGV as listed in table below.</td><td rowspan="8"><u>Locations</u>
<table><tr><th>Longwall</th><th>Potential Impact Sites</th><th>Reference Sites</th></tr><tr><td>LW S1A</td><td>BR12-QLa
BR13-QRLa</td><td rowspan="3">BR16-QLa</td></tr><tr><td>LW S2A</td><td>BR18-QLa
All sites above</td></tr><tr><td>LW S3A</td><td>BR17-QLa
All sites above</td></tr><tr><td>LW S4A</td><td rowspan="2">BR6-QLa
All sites above</td><td rowspan="2">DT4-QLa
DT3-QLa
All sites above</td></tr><tr><td>LW S5A</td></tr><tr><td>LW S6A</td><td rowspan="2">HC13-QLa
HC15-QLa
HC4-QRLa
HC9-QLa
HC3-QLa
All sites above</td><td rowspan="2">HC2-QLa
HC17-QLa
HC1-QLa
All sites above</td></tr><tr><td>LW S7A</td></tr></table>
All monitoring locations are shown in Figure 19 of the Water Management Plan.

<u>Monitoring Frequency</u>
Pre-mining
Monthly sampling prior to secondary extraction or other relevant mining activity.

During Mining
Monthly sampling and analysis or as required by a specified action relevant to a trigger level.

Post-mining
Monthly sampling and analysis for a minimum of 12 months following the completion of LW S7A or as required in accordance with a Watercourse Corrective Action Management Plan.</td><td>Normal Condition</td><td></td><td></td></tr>
<tr><td>• Exceedance of an SSGV does not occur or occurs for less than three consecutive months.</td><td>• Continue monitoring and review of data as per monitoring program.</td><td>• No response required.</td></tr>
<tr><td>Level 1</td><td></td><td></td></tr>
<tr><td>• Exceedance of an SSGV occurs at a given potential impact site in three consecutive months and the same has not occurred at the reference site(s).</td><td>• Actions as required for Normal Condition.
• Assess if the trigger was exceeded during the baseline period prior to commencement of mining activities.
• Review water quality trends along watercourse (upstream to downstream) to identify spatial changes with consideration to climatic conditions.
• Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, groundwater quality monitoring results) necessary to inform assessment.
• Consider and decide on reasonable and feasible options for remediation as relevant (e.g. limestone cobbles for increasing pH level).</td><td>• Report trigger exceedance to DPHI and key stakeholders.
• Report trigger exceedance and investigation outcomes in Annual Review.
• Provide DPHI and key stakeholders with proposed CMAs for consultation (e.g. limestone cobbles for increasing pH level).
• Implement CMAs, subject to land access.
• Monitor and report on success of CMAs in Annual Review.</td></tr>
<tr><td>Level 2</td><td></td><td></td></tr>
<tr><td>• Exceedance of an SSGV occurs at a given potential impact sites in four or five consecutive months and the same has not occurred at the reference site(s).</td><td>• Actions as stated in Level 1.
• Consider increasing monitoring and review of data frequency at sites where Level 2 has been reached or at other relevant sites, subject to land access, as follows:
o Fortnightly, for sites within the active subsidence zone.
o Monthly, outside of the active subsidence period.
Reasons for not increasing monitoring frequency could include confident identification of causation (e.g. singular, anthropogenic, non-mining related change or confirmed as a mining-related impact that resulted in a water quality change).
• If increased monitoring is adopted, undertake further analysis of water quality trends along creek (upstream to downstream) to identify spatial changes with consideration to climatic conditions.
• Review CMAs in light of findings from further investigations and consider additional remediation options.
• Review Water Management Plan and modify if necessary.</td><td>• Responses as stated in Level 1.
• Advise DPHI and key stakeholders of any required amendments to Water Management Plan.
• Provide findings of CMA review to DPHI and key stakeholders for consultation.
• Implement additional CMAs, subject to land access.</td></tr>
<tr><td>Level 3</td><td></td><td></td></tr>
<tr><td>• Exceedance of an SSGV occurs at a given potential impact site in six consecutive months and the same has not occurred at the reference site(s).</td><td>• Actions as stated in Level 2.
• If mining related impact unconfirmed, increase monitoring and review of data frequency at sites where Level 3 has been reached or at other relevant sites, subject to land access, as follows:
o Fortnightly, for sites within the active subsidence zone.
o Monthly, outside of the active subsidence period.
• Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing), other catchment changes, effect unrelated to mining or the prevailing climate.
• Undertake an investigation to determine if an exceedance of the performance measure is likely.</td><td>• Responses as stated in Level 2.
• If relevant, notify Commonwealth DCCEEW of any predictions of an exceedance of a performance measure within two business days.</td></tr>
<tr><td>Exceeds Performance Measure</td><td></td><td></td></tr>
<tr><td>• It is concluded from the Level 3 investigation that mining results in exceedance of an SSGV at a given potential impact site for six or more consecutive months.</td><td>• Investigate reasons for the performance measure exceedance.
• Based on the outcomes of the investigation, review predictions of subsidence impacts and environmental consequences associated with future longwall extraction.</td><td>• Submit a report to DPHI (in accordance with E4 of SSD 8445) within 14 days of the exceedance occurring (or other timeframe agreed by DPHI).
• Notify Commonwealth DCCEEW of any detection or predictions of an exceedance of a performance measure within two business days.</td></tr>
</table>

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
				• Submit an Impact Response Plan to Commonwealth DCCEEW (in accordance with Condition 11 of the DAWE (now Commonwealth DCCEEW) Consent for the Tahmoor South Project). • Offer site visit with DPHI and other key stakeholders. • Develop Watercourse Corrective Action Management Plan (WCAMP) in consultation with the Resources Regulator, DPHI and other key stakeholders (in accordance with C12 of SSD 8445). The stream remediation measures in the WCAMP could include grout curtain and grout pattern injection. • Implement approved WCAMP, subject to land access.

Site Specific Guideline Value (SSGV)

Parameter	TT1-QLa	TT2-QLa	TT7-QLa	TT12-QLa	TT13-QLa	TT14-QLa	DT3-QLa	DT4-QLa
No. of Values[2]	56	12	35	13	13	13	49	44
pH (pH units)	6.5 – 8	6 – 8	6.5 – 8	6.5 – 8	6.5 – 8	6.5 – 8	6.5 - 8	6.5 - 8
EC (µS/cm)	512	350	359	350	350	350	350	350
Dissolved Aluminium (mg/L) pH > 6.5	0.1	0.17	0.06	0.1	0.092	0.11	0.08	0.2
Dissolved Copper (mg/L)	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014
Dissolved Iron (mg/L)	0.76	0.55	0.81	0.64	0.47	0.57	0.48	0.60
Dissolved Manganese (mg/L)	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Dissolved Nickel (mg/L)	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011
Dissolved Zinc (mg/L)	0.03	0.02	0.03	0.008	0.008	0.008	0.008	0.008

Notes:
[1] As defined by the SSGV.
[2] Minimum number of values used in SSGV derivation - for some constituents, a greater number of values were adopted.

WATER MANAGEMENT PLAN TARP – WMP3 POOL WATER LEVEL FOR ALL WATERCOURSES WITHIN THE SUBSIDENCE AREA[1]

Performance Measure and Indicator, TARP Objective and Assessment Criteria

Performance Measure Feature
All watercourses within the Subsidence Area[1].

Performance Measure
No greater subsidence impact or environmental consequences to water quality, water flows (including baseflow) or stream health (including riparian vegetation), than predicted in the EIS.

The EIS concludes that where the longwalls directly mine beneath the streams, it is considered likely that fracturing would result in surface water flow diversion and that localised and transient increases in water quality constituents would occur[2]. The performance measure will be considered to be exceeded if subsidence impacts cannot be repaired in a manner that restores pool water holding capacity and stream health. Remediation measures will be developed as required and detailed in the Watercourse Corrective Action Management Plan (C12 of the SSD 8445). These plans will contain relevant performance indicators specific to remediation performance measures.

Performance Indicator
Water level decline as defined in the Level 1 to Level 3 trigger, where a Level 3 trigger denotes progression towards a potential exceedance of the performance measure.

TARP Objective
This TARP defines levels of variation in pool water level from normal conditions[3] and the actions required to be implemented in response to each level of variation.

Assessment Criteria
- Comparison of baseline and operational recorded water level data (all levels).
- Water level recession analysis for Level 2 and above.

Monitoring Program

Locations

Longwall	Potential Impact Sites	Reference Sites
LW S1A	TT7-QLa TT12-QLa TT13-QLa TT14-QLa	TT1-QLa
LW S2A	TT9-QLa TT3-QLa All sites above	
LW S3A	TT2-QLa All sites above	
LW S4A	BR3-QLa TT1-QLa All sites above	DT4-QLa DT3-QLa
LW S5A		
LW S6A		
LW S7A		

All monitoring locations are shown in Figure 19 of the Water Management Plan.

Monitoring Frequency

Pre-mining
Continuous record and monthly manual measurements. Data downloaded prior to the commencement of secondary extraction of the relevant longwall.

During Mining
Continuous record and monthly manual measurements. Data downloaded and reviewed monthly.

Post-mining
Continuous record and monthly manual measurements for a minimum of 12 months following the completion of LW S7A or as required in accordance with a Watercourse Corrective Action Management Plan.

Management

Trigger	Action	Response
Normal Condition		
• The recorded water level has not declined below the recorded baseline minimum level (for more than one 24 hour period for automated pool water level).	• Continue monitoring and review of data as per monitoring program.	• No response required.
Level 1		
• The recorded water level has declined by greater than 10 centimetres (cm) below the recorded baseline minimum level (for more than one 24 hour period for automated pool water level) and the same has not occurred at the reference site(s).	• *Actions as required for Normal Condition.* • Review water level trends along watercourse (upstream to downstream) to identify spatial changes with consideration to climatic conditions. • Review streamflow data recorded at TT-F1 and conduct streamflow reduction assessment. • Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, groundwater level monitoring results) necessary to inform assessment.	• Report trigger exceedance to DPHI and key stakeholders. • Report trigger exceedance and investigation outcomes in Annual Review.
Level 2		

• The recorded water level has declined atypically[4] below the recorded baseline minimum level for less than one month (as a consecutive period) and the same has not occurred at the reference site(s).	• *Actions as stated in Level 1.*
	• Consider increasing monitoring and review of data frequency at sites where Level 2 has been reached or at other relevant sites, subject to land access, as follows:
	  ○ Fortnightly, for sites within the active subsidence zone.
	  ○ Monthly, outside of the active subsidence period.
	• Reasons for not increasing monitoring frequency could include confident identification of causation (e.g. singular, anthropogenic, non-mining related change or confirmed as a mining-related impact that resulted in a water level change).
	• If increased monitoring is undertaken, conduct further analysis of water level trends along creek (upstream to downstream) to identify spatial changes with consideration to climatic conditions.
	• Review Water Management Plan and modify if necessary.
		• *Responses as stated in Level 1.*
		• Advise DPHI and key stakeholders of any required amendments to Water Management Plan.

Level 3		

• The recorded water level has declined atypically[4] below the recorded baseline minimum level for greater than one month (as a consecutive period) and the same has not occurred at the reference site(s).	• *Actions as stated in Level 2.*
	• If mining related impact unconfirmed, increase monitoring and review of data frequency at sites where Level 3 has been reached or at other relevant sites, subject to land access, as follows:
	  ○ Fortnightly, for sites within the active subsidence zone.
	  ○ Monthly, outside of the active subsidence period.
	• Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing), other catchment changes, effect unrelated to mining or the prevailing climate.
		• *Responses as stated in Level 2.*
		If it is concluded from the detailed investigation that watercourses have been damaged by subsidence impacts:
		• Offer site visit with DPHI and other key stakeholders.
		• Develop Watercourse Corrective Action Management Plan (WCAMP) in consultation with the Resources Regulator, DPHI and other key stakeholders (in accordance with C12 of SSD 8445). The stream remediation measures in the WCAMP could include grout curtain and grout pattern injection.
		• Implement approved WCAMP, subject to land access.

Notes:
[1] Subsidence Area is defined as the 'Subsidence Study Area' as illustrated in Figure 1 of Appendix 2 of SSD 8445.
[2] Due to the predicted surface fracturing of watercourses which directly overlie the longwall panels.
[3] As indicated by the baseline water level and recession rate.
[4] 'Atypical' surface water characteristics relate to a notable and/or rapid water level decline or change in the slope of the falling limb of the hydrograph or the water level recessionary behaviour below the cease to flow level which is inconsistent with baseline conditions and cannot be attributed to climatic conditions

WATER MANAGEMENT PLAN TARP – WMP4 POOL WATER LEVEL FOR OTHER WATERCOURSES (BARGO RIVER AND HORNES CREEK)

Performance Measure and Indicator, TARP Objective and Assessment Criteria

Performance Measure Feature
Other watercourses.

Performance Measure
Negligible environmental consequences including beyond those predicted in the EIS, including:
- Negligible diversion of flows or changes in the natural drainage behaviour of pools.

Performance Indicator
The performance measure will be considered to be exceeded if a Level 3 TARP is triggered in relation to water level changes and the investigation outcomes indicate a mining related impact based on monitoring data for sites in Hornes Creek and the Bargo River.

TARP Objective
This TARP defines levels of variation in pool water level from normal conditions[1] and the actions required to be implemented in response to each level of variation.

Assessment Criteria
- Comparison of baseline and operational recorded water level data (all levels).
- Water level recession analysis for Level 2 and above.

Monitoring Program

Locations

Longwall	Potential Impact Sites	Reference Sites
LW S1A	BR12-QLa BR13-QRLa	BR16-QLa[2]
LW S2A	BR18-QLa All sites above	
LW S3A	BR17-QLa All sites above	
LW S4A LW S5A	BR6-QLa All sites above	DT4-QLa DT3-QLa All sites above
LW S6A LW S7A	HC13-QLa HC15-QLa HC4-QRLa HC9-QLa HC3-QLa All sites above	HC2-QLa HC17-QLa HC1-QLa All sites above

All monitoring locations are shown in Figure 19 of the Water Management Plan.

Monitoring Frequency

Pre-mining
Continuous record and monthly manual measurements. Data downloaded prior to the commencement of secondary extraction of the relevant longwall.

During Mining
Continuous record and monthly manual measurements. Data downloaded and reviewed monthly.

Post-mining
Continuous record and monthly manual measurements for a minimum of 12 months following the completion of LW S7A or as required in accordance with a Watercourse Corrective Action Management Plan.

Management

Trigger	Action	Response
Normal Condition		
• The recorded water level has not declined below the recorded baseline minimum level (for more than one 24 hour period for automated pool water level).	• Continue monitoring and review of data as per monitoring program.	• No response required.
Level 1		
• The recorded water level has declined by greater than 10 centimetres (cm) below the recorded baseline minimum level (for more than one 24 hour period for automated pool water level) and the same has not occurred at the reference site(s).	• *Actions as required for Normal Condition.* • Review water level trends along watercourse (upstream to downstream) to identify spatial changes with consideration to climatic conditions. • Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, groundwater level monitoring results) necessary to inform assessment.	• Report trigger exceedance to DPHI and key stakeholders. • Report trigger exceedance and investigation outcomes in Annual Review.
Level 2		

• The recorded water level has declined atypically[3] below the recorded baseline minimum level for less than one month (as a consecutive period) and the same has not occurred at the reference site(s).	• *Actions as stated in Level 1.*
	• Consider increasing monitoring and review of data frequency at sites where Level 2 has been reached or at other relevant sites, subject to land access, as follows:
	  ○ Fortnightly, for sites within the active subsidence zone.
	  ○ Monthly, outside of the active subsidence period.
	Reasons for not increasing monitoring frequency could include confident identification of causation (e.g. singular, anthropogenic, non-mining related change or confirmed as a mining-related impact that resulted in a water level change).
	• If increased monitoring is adopted, undertake further analysis of water level trends along creek (upstream to downstream) to identify spatial changes with consideration to climatic conditions.
	• Complete water level recession analysis for sites where Level 2 has been reached.
	• Review Water Management Plan and modify if necessary.
		• *Responses as stated in Level 1.*
		• Advise DPHI and key stakeholders of any required amendments to Water Management Plan.

Level 3		

• The recorded water level has declined atypically[3] below the recorded baseline minimum level for greater than one month (as a consecutive period) and the same has not occurred at the reference site(s).	• *Actions as stated in Level 2.*
	• If mining related impact unconfirmed, increase monitoring and review of data frequency at sites where Level 3 has been reached or at other relevant sites, subject to land access, as follows:
	  ○ Fortnightly, for sites within the active subsidence zone.
	  ○ Monthly, outside of the active subsidence period.
	• Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing), other catchment changes, effect unrelated to mining or the prevailing climate.
	• Undertake an investigation to determine if an exceedance of the performance measure is likely.
		• *Responses as stated in Level 2.*
		• If relevant, notify Commonwealth DCCEEW of any predictions of an exceedance of a performance measure within two business days.

Exceeds Performance Measure		
• It is concluded from the detailed investigation that mining has resulted in an atypical[2] decline in water level for greater than one month (as a consecutive period).	• Investigate reasons for the performance measure exceedance. • Based on the outcomes of the investigation, review predictions of subsidence impacts and environmental consequences associated with further longwall extraction.	• Submit a report to DPHI (in accordance with Condition E4 of SSD 8445) within 14 days of the exceedance occurring (or other timeframe agreed by DPHI). • Notify Commonwealth DCCEEW of any detection or predictions of an exceedance of a performance measure within two business days. • Submit an Impact Response Plan to Commonwealth DCCEEW (in accordance with Condition 11 of the DAWE (now Commonwealth DCCEEW) Consent for the Tahmoor South Project).

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
				• Offer site visit with DPHI and other key stakeholders. • Develop Watercourse Corrective Action Management Plan (WCAMP) in consultation with the Resources Regulator, DPHI and other key stakeholders (in accordance with C12 of SSD 8445). The stream remediation measures in the WCAMP could include grout curtain and grout pattern injection. • Implement approved WCAMP, subject to land access.

Notes:
[1] As indicated by the baseline water level and recession rate.
[2] Data collected from BR11-QLa (water quality data collected between 2012-2021 and water level data collected between 2013-2021) will be used in combination with data from BR16-QLa to provide a long-term baseline dataset for the Bargo River upstream of mining activities.
[3] 'Atypical' surface water characteristics relate to a notable and/or rapid water level decline or change in the slope of the falling limb of the hydrograph or the water level recessionary behaviour below the cease to flow level which is inconsistent with baseline conditions and cannot be attributed to climatic conditions.

WATER MANAGEMENT PLAN TARP – WMP5 PHYSICAL FEATURES AND NATURAL BEHAVIOUR OF WATERCOURSES WITHIN THE SUBSIDENCE AREA[1]

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Feature All watercourses within the Subsidence Area[1]. **Performance Measure** No greater subsidence impact or environmental consequences to water quality, water flows (including baseflow) or stream health (including riparian vegetation), than predicted in the EIS. The EIS concludes that where the longwalls directly mine beneath the streams, it is considered likely that fracturing would result in surface water flow diversion and that localised and transient increases in water quality constituents would occur[2]. The performance measure will be considered to be exceeded if subsidence impacts cannot be repaired in a manner that restores pool water holding capacity and stream health. Remediation measures will be developed as required and detailed in the Watercourse Corrective Action Management Plan (C12 of the SSD 8445). These plans will contain relevant performance indicators specific to remediation performance measures. **Performance Indicator** Variation in pool physical features and natural behaviour, as defined in the Level 1 to Level 3 trigger, where a Level 3 trigger denotes progression towards a potential exceedance of the performance measure. **TARP Objective** This TARP defines levels of variation in pool physical features and natural behaviour and the actions required to be implemented in response to each level of variation. **Assessment Criteria** Comparison of baseline and operational pool physical features and natural behaviour.	**Locations** Accessible pools and reaches in Teatree Hollow, Teatree Hollow Tributary and Bargo River Tributary (subject to land access). All monitoring locations are shown in Figure 20 of the Water Management Plan. Channel morphology site CM7, refer Figure 21. **Monitoring Frequency** **Pre-mining** One observation prior to mining using fixed location photo points. **During Mining** Observations every month during the active subsidence period (after 200 m of secondary extraction of relevant longwall) for sites within the active subsidence zone[3] using fixed location photo points. **Post-mining** Quarterly observations over 12 months for pools that are no longer within the active subsidence zone or as required in accordance with a Watercourse Corrective Action Management Plan.	**Normal Condition**		
		• No observed impact to pool water level, overland connected flow, iron staining, gas release or turbidity - as compared with baseline conditions.	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		• Visually observed anomalous change in water level, overland connected flow, iron staining, gas release or turbidity - as compared with baseline conditions - occurs in one month and the same has not occurred at the reference site(s)[3]. AND/OR • Visual observation of fracturing.	• *Actions as required for Normal Condition.* • Assess visual change along watercourse (upstream to downstream) to observe any spatial changes with consideration to climatic conditions. • Discuss findings with and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water monitoring results, groundwater monitoring results) necessary to inform assessment. • Consider increasing monitoring and review of data frequency at sites where Level 1 has been reached or at other relevant sites, subject to land access, as follows: o Fortnightly, for sites within the active subsidence zone. o Monthly, outside of the active subsidence period. Reasons for not increasing monitoring frequency could include confident identification of causation (e.g., surface fracturing of weathered bedrock that does not affect water holding capacity of rockbar control or pool base or confirmed as a mining-related impact).	• Report trigger exceedance to DPHI and key stakeholders. • Report trigger exceedance and investigation outcomes in Annual Review.
		Level 2		
		• Visually observed anomalous change in water level, overland connected flow, iron staining, gas release or turbidity - as compared with baseline conditions - occurs for two consecutive months and the same has not occurred at the reference site(s).	• *Actions as stated in Level 1.* • Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing other catchment changes, effect unrelated to mining or the prevailing climate). • Review Water Management Plan and modify if necessary. • If mining related impact unconfirmed, increase monitoring and review of data frequency at sites where Level 2 has been reached or at other relevant sites, subject to land access, as follows: o Fortnightly, for sites within the active subsidence zone. o Monthly, outside of the active subsidence period.	• *Responses as stated in Level 1.* • Advise DPHI and key stakeholders of any required amendments to Water Management Plan.
		Level 3		
		• Visually observed anomalous change in water level, overland connected flow, iron staining, gas release or turbidity - as compared with baseline conditions - occurs for three consecutive months and the same has not occurred at the reference site(s). AND • The change in behaviour has been investigated and confirmed to be related to mining effects.	• *Actions as stated in Level 2.*	• *Responses as stated in Level 2.* • Offer site visit with DPHI and other key stakeholders. • Develop Watercourse Corrective Action Management Plan (WCAMP) in consultation with the Resources Regulator, DPHI and other key stakeholders (in accordance with C12 of SSD 8445). The stream remediation measures in the WCAMP could include grout curtain and grout pattern injection. • Implement approved WCAMP, subject to land access.

Notes:
[1] Subsidence Area is defined as the 'Subsidence Study Area' as illustrated in Figure 1 of Appendix 2 of SSD 8445.
[2] Due to the predicted surface fracturing of watercourses which directly overlie the longwall panels.
[3] Survey area to include upstream, downstream and adjacent pools (to the extent of the potential impact) where a trigger exceedance has occurred at a potential impact site(s) in accordance with the TARPs.

WATER MANAGEMENT PLAN TARP – WMP6 PHYSICAL FEATURES AND NATURAL BEHAVIOUR OF POOLS FOR OTHER WATERCOURSES (BARGO RIVER AND HORNES CREEK)

<table>
<tr><th rowspan="2">Performance Measure and Indicator, TARP Objective and Assessment Criteria</th><th rowspan="2">Monitoring Program</th><th colspan="3">Management</th></tr>
<tr><th>Trigger</th><th>Action</th><th>Response</th></tr>
<tr><td rowspan="6"><u>Performance Measure Feature</u>
Other watercourses.

<u>Performance Measure</u>
Negligible environmental consequences including beyond those predicted in the EIS, including:
• Negligible diversion of flows or changes in the natural drainage behaviour of pools;
• Negligible gas releases and iron staining; and
• Negligible increase in water turbidity.

<u>Performance Indicator</u>
The performance measure will be considered to be exceeded if changes in physical features and natural behaviour of pools occur for three consecutive months and the investigation outcomes indicate a mining related impact based on visual observation records for sites in Hornes Creek and the Bargo River.

<u>TARP Objective</u>
This TARP defines levels of variation in pool physical features and natural behaviour and the actions required to be implemented in response to each level of variation.

<u>Assessment Criteria</u>
Comparison of baseline and operational pool physical features and natural behaviour.</td><td rowspan="6"><u>Locations</u>
<table><tr><th>Longwall</th><th>Potential Impact Sites</th><th>Reference Sites</th></tr><tr><td>LW S1A</td><td>BR12-QLa
BR13-QRLa</td><td rowspan="4">BR16-QLa</td></tr><tr><td>LW S2A</td><td>BR18-QLa
All sites above</td></tr><tr><td>LW S3A</td><td>BR17-QLa
All sites above</td></tr><tr><td>LW S4A
LW S5A</td><td>BR6-QLa
All sites above</td><td>DT4-QLa
DT3-QLa
All sites above</td></tr><tr><td>LW S6A
LW S7A</td><td>HC13-QLa
HC15-QLa
HC4-QRLa
HC9-QLa
HC3-QLa
All sites above</td><td>HC2-QLa
HC17-QLa
HC1-QLa
All sites above</td></tr></table>
All monitoring locations are shown in Figure 20 of the Water Management Plan.

Pre-mining
One observation prior to mining using fixed location photo points.

During Mining
Observations every month during the active subsidence period (after 200 m of secondary extraction of relevant longwall) for sites within the active subsidence zone using fixed location photo points.

Post-mining
Quarterly observations over 12 months for pools that are no longer within the active subsidence zone or as required in accordance with a Watercourse Corrective Action Management Plan.</td><td>Normal Condition</td><td></td><td></td></tr>
<tr><td>• No observed impact to pool water level, overland connected flow, iron staining, gas release, turbidity or channel stability - as compared with baseline conditions.</td><td>• Continue monitoring and review of data as per monitoring program.</td><td>• No response required.</td></tr>
<tr><td>Level 1</td><td></td><td></td></tr>
<tr><td>• Visually observed anomalous change in water level, overland connected flow, iron staining, gas release or turbidity - as compared with baseline conditions - occurs in one month and the same has not occurred at the reference site(s).
AND/OR
• Visual observation of fracturing.</td><td>• Actions as required for Normal Condition.
• Assess visual change along watercourse (upstream to downstream) to observe any spatial changes with consideration to climatic conditions.
• Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water monitoring results, groundwater monitoring results) necessary to inform assessment.
• Consider increasing monitoring and review of data frequency at sites where Level 1 has been reached or at other relevant sites, subject to land access, as follows:
o Fortnightly, for sites within the active subsidence zone.
o Monthly, outside of the active subsidence period.
Reasons for not increasing monitoring frequency could include confident identification of causation (e.g. surface fracturing of weathered bedrock that does not affect water holding capacity of rockbar control or pool base or confirmed as a mining-related impact).</td><td>• Report trigger exceedance to DPHI and key stakeholders.
• Report trigger exceedance and investigation outcomes in Annual Review.</td></tr>
<tr><td>Level 2</td><td></td><td></td></tr>
<tr><td>• Visually observed anomalous change in water level, overland connected flow, iron staining, gas release or turbidity - as compared with baseline conditions - occurs for two consecutive months and the same has not occurred at the reference site(s).</td><td>• Actions as stated in Level 1.
• Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing other catchment changes, effect unrelated to mining or the prevailing climate).
• Review Water Management Plan and modify if necessary.
• If mining related impact unconfirmed, increase monitoring and review of data frequency at sites where Level 2 has been reached or at other relevant sites, subject to land access, as follows:
o Fortnightly, for sites within the active subsidence zone.
o Monthly, outside of the active subsidence period.
• Undertake an investigation to determine if an exceedance of the performance measure is likely.</td><td>• Responses as stated in Level 1.
• Advise DPHI and key stakeholders of any required amendments to Water Management Plan.
• If relevant, notify Commonwealth DCCEEW of any predictions of an exceedance of a performance measure within two business days.</td></tr>
<tr><td>Exceeds Performance Measure</td><td></td><td></td></tr>
<tr><td>• Visually observed anomalous change in water level, overland connected flow, iron staining, gas release or turbidity - as compared with baseline conditions - occurs for three consecutive months and the same has not occurred at the reference site(s).
AND
• The change in behaviour has been investigated and confirmed to be related to mining effects.</td><td>• Actions as stated in Level 2.
• Investigate reasons for the performance measure exceedance.
• Based on the outcomes of the investigation, review predictions of subsidence impacts and environmental consequences associated with further longwall extraction.</td><td>• Responses as stated in Level 2.
• Submit a report to DPHI (in accordance with Condition E4 of SSD 8445) within 14 days of the exceedance occurring (or other timeframe agreed by DPHI).
• Notify Commonwealth DCCEEW of any detection or predictions of an exceedance of a performance measure within two business days.
• Submit an Impact Response Plan to Commonwealth DCCEEW (in accordance with Condition 11 of the DAWE (now Commonwealth DCCEEW) Consent for the Tahmoor South Project).
• Offer site visit with DPHI and other key stakeholders.
• Develop Watercourse Corrective Action Management Plan (WCAMP) in consultation with the Resources Regulator, DPHI and other key stakeholders (in accordance with C12 of SSD 8445). The stream</td></tr>
</table>

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	Action	Response
				remediation measures in the WCAMP could include grout curtain and grout pattern injection. • Implement approved WCAMP, subject to land access.

WATER MANAGEMENT PLAN TARP – WMP7 CHANNEL STABILITY, SEDIMENTATION AND EROSION

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Feature No performance measure relevant[1,2,3]. **TARP Objective** This TARP defines levels of variation in channel stability, erosion and sedimentation and the actions required to be implemented in response to each level of variation. **Assessment Criteria** Comparison of baseline and operational condition of headwater streams and soft knickpoints.	**Locations** As shown in Figure 21 of the Water Management Plan: • 10 headwater sites • Channel morphology sites CM1, CM4 and CM6 • Soft knickpoints **Monitoring Frequency** **Pre-mining** • One observation prior to mining using fixed location photo points. • One inspection of 10 headwater sites. **During Mining** • Observations of knickpoint formation every month during the active subsidence period for sites within the active subsidence zone using fixed location photo points. • Annual inspection of 10 headwater sites. **Post-mining** • One observation of knickpoint formation at sites that are no longer within the active subsidence zone using fixed location photo points. • One inspection of 10 headwater sites. • Post-mining geomorphology survey following completion of mining.	**Normal Condition**		
		• No further development of soft knickpoints or increased erosion of headwater streams.	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		

		• Visually observed minor increase in knickpoint development and/or minor erosion and sedimentation of headwater streams.	• *Actions as required for Normal Condition.*
			• Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, biodiversity monitoring results) necessary to inform assessment.
			• Consider increasing monitoring and review of data frequency at sites where Level 1 has been reached or at other relevant sites, subject to land access, as follows:
			  ○ Fortnightly, for sites within the active subsidence zone.
			  ○ Monthly, outside of the active subsidence period.
			Reasons for not increasing monitoring frequency could include confident identification of causation (e.g. singular, anthropogenic, non-mining related change or confirmed as a mining-related impact that resulted in increased erosion).
			• Consider and decide on reasonable and feasible options for remediation as relevant (e.g. enhanced vegetation establishment, rock armouring).
				• Report trigger exceedance to DPHI and key stakeholders.
				• Report trigger exceedance and investigation outcomes in Annual Review.
				• Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for approval (e.g. enhanced vegetation establishment, rock armouring).
				• Implement CMAs, subject to land access.
				• Monitor and report on success of CMAs in Review.

		Level 2		

		• Visually observed moderate increase in knickpoint development and/or moderate or greater increase in erosion and sedimentation of headwater streams.	• *Actions as stated in Level 1.*
			• If mining related impact unconfirmed, increase monitoring and review of data frequency at sites where Level 2 has been reached or at other relevant sites, subject to land access, as follows:
			  ○ Fortnightly, for sites within the active subsidence zone.
			  ○ Monthly, outside of the active subsidence period.
			• Undertake an investigation to assess if the change in behaviour is related to mining effects (e.g. subsidence induced, other catchment changes, effect unrelated to mining or the prevailing climate).
			• Obtain specialist advice on further CMAs.
			• Review CMAs in light of findings from further investigations and consider additional remediation options.
			• Review Water Management Plan and modify if necessary.
				• *Responses as stated in Level 1.*
				• Advise DPHI and key stakeholders of any required amendments to Water Management Plan.
				If it is concluded from the detailed investigation that watercourses have been damaged by subsidence impacts:
				• Offer site visit with DPHI and other key stakeholders.
				• Provide findings of CMA review to DPHI and key stakeholders for consultation.
				• Implement additional CMAs, subject to land access.

Notes:
[1] Subsidence Area is defined as the 'Subsidence Study Area' as illustrated in Figure 1 of Appendix 2 of SSD 8445.
[2] It is noted that SSD 8445 does not specify a performance measure in relation to channel stability, sedimentation and erosion for all watercourses within the Subsidence Area[1].
[3] It is noted that no soft knickpoints have been mapped in Hornes Creek or Bargo River. Therefore, assessment of 'decline in baseline channel stability' for these watercourses is not applicable.

WATER MANAGEMENT PLAN TARP – WMP8 SHALLOW GROUNDWATER LEVELS (OPEN STANDPIPES AND PRIVATE BORES)

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Feature No performance measure relevant. **TARP Objective** This TARP defines levels of deviation in groundwater level from 'normal' or baseline conditions and the actions to be implemented in response to each level deviation. This TARP supports TARP WMP13, where groundwater levels as they pertain to groundwater dependent ecosystems (GDEs) (Thirlmere Lakes) are covered. **Assessment Criteria** Bore specific trigger values based on baselines data for each reporting level.	**Locations** **Open standpipes** Existing sites: P51a, P51b, P52, REA4, P53a, P53b, P53c, P54a, P54b, P54c, P55a, P55b, P55c, P56a, P56b, P56c P50a, P50b, P50c, P57a, P57b, P57c[3] **Private bores** GW109257, GW104008, GW112473, GW104659, GW104323 All monitoring locations are shown in Figure 324 of the Water Management Plan. **Monitoring Frequency** **Pre-mining** Continuous logger (hourly intervals) and monthly manual measurements of water level. **During Mining** Continuous logger (hourly intervals) and monthly manual measurements of water level. **Post-mining** Continuous record (where loggers installed) and quarterly manual measurements of water level for a minimum of 12 months following the completion of active dewatering or as deemed necessary in consideration to the status of aquifer recovery or as required for future extraction activities.	**Normal Condition**		
		• Groundwater level remains consistent with baseline variability and pre-mining trends with reductions in groundwater level less than two meters.	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		• Greater than 2 m water level reduction[1] for a period of greater than 6 months following the commencement of extraction.	For Private Bores and Open Standpipe Monitoring Bores • *Actions as required for Normal Condition.* • Undertake an investigation to assess cause and determine if mining related. • Undertake investigation to demonstrate if the decline will impact the long-term viability of the affected water supply works. • Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water level results). The investigation will be commenced/completed as efficiently as practicable. If the changes have been confirmed to be related to mining effects: For Private Bores: • Where impact is deemed attributable to mining, initiate negotiations with impacts landowners as soon as practicable. Consider all reasonable and feasible options for remediation as relevant (e.g. extending the depth of the bore, establishment of additional bores, etc - as per Section 6.2.1.4 of the Water Management Plan). For Open Standpipe Monitoring Bores • For monitoring sites relevant to Thirlmere Lakes or associated with surface water monitoring sites, initiate groundwater – surface water interaction TARP.	For Private Bores and Open Standpipe Monitoring Bores: • Report trigger exceedance to DPHI and key stakeholders. • Report trigger exceedance and investigation outcomes in Annual Review. If the changes have been confirmed to be related to mining effects: For Private Bores: • Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for consultation (e.g. extending the depth of the bore, establishment of additional bores, compensation to affected landowners as detailed in Section 6.2.1.4 of the Water Management Plan). • Implement CMAs, subject to land access (finalise negotiations and implement the agreed "make-good" arrangements) • Monitor and report on success of CMAs in Annual Review.
		Level 2		
		• Water level declines below the average between the 'maximum modelled drawdown' (Level 3 trigger) and the '2 m drawdown' (Level 1 trigger)[1] for a period of greater than 6 months following the commencement of extraction. AND • The reduction in water level is determined not to be controlled by climatic or external anthropogenic factors.	For Private Bores and Open Standpipe Monitoring Bores: • *Actions as stated in Level 1.* • Consider increasing frequency of monitoring and review of data frequency at sites where Level 2 has been reached or at other relevant sites, subject to land access., as follows: ○ Fortnightly, for sites within the active subsidence zone. • Reasons for not increasing monitoring frequency could include confident identification causation that do not require further monitoring (e.g. singular anthropogenic impact resulting in water level change, or confirmed as a mining-related impact). Increased monitoring could be beneficial where commensurate responses in paired surface water monitoring locations have been observed. • Compare against base case and deterministic model scenarios[2]. • Review Water Management Plan and modify if necessary. For Private Bores: • Review CMAs in light of findings from further investigations and consider additional reasonable and feasible options.	For Private Bores and Open Standpipe Monitoring Bores: • *Responses as stated in Level 1.* • Advise DPHI and key stakeholders of any required amendments to Water Management Plan. For Private Bores: • Provide findings of CMA review to DPHI and key stakeholders for consultation. • Implement additional CMAs, subject to land access.

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
		Level 3		
		• Water level reduction greater than the maximum modelled drawdown[1] for a period of greater than 6 months following the commencement of extraction. AND • The reduction in water level is determined not to be controlled by climatic or external anthropogenic factors.	For Private Bores and Open Standpipe Monitoring Bores: • *Actions as stated in Level 2.* • Increase monitoring and review of data frequency for sites where Level 3 has been reached, and cause is unknown, Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing, other catchment changes, effect unrelated to mining or the prevailing climate).	For Private Bores and Open Standpipe Monitoring Bores: • *Responses as stated in Level 2.* For Private Bores: • Develop a Rehabilitation Management Plan in consultation with DPHI and key stakeholders. • Implement Rehabilitation Management Plan, subject to land access.

Notes:
[1] Level 1, 2 and 3 triggers for water level reduction is provided in Table 6-3 in Appendix E of the Water Management Plan.
[2] "Deterministic" model scenario refers to the predictive scenario modelling utilised to determine the trigger level.
[3] Trigger levels to be defined for P50 and P57 bores when suitable baseline data available

WATER MANAGEMENT PLAN TARP – WMP9 SHALLOW GROUNDWATER PRESSURE (VWP SENSORS < 200 m DEPTH)

<table>
<tr><th rowspan="2">Performance Measure and Indicator, TARP Objective and Assessment Criteria</th><th rowspan="2">Monitoring Program</th><th colspan="3">Management</th></tr>
<tr><th>Trigger</th><th>Action</th><th>Response</th></tr>
<tr><td rowspan="8"><u>Performance Measure Feature</u>
No performance measure relevant.

<u>TARP Objective</u>
This TARP defines levels of deviation in groundwater level from ‘normal’ or baseline conditions and the actions to be implemented in response to each level deviation.

<u>Assessment Criteria</u>
Bore specific trigger values based on baselines data for each reporting level.</td><td rowspan="8"><u>Locations</u>
TBC032, TBC033, TBC009, TBC018, TBC0039
Monitoring of all VWP < 200 m depth intakes.

Reference Sites: TBC027, TBC034, TBC038

All monitoring locations are shown in Figure 23 of the Water Management Plan.

<u>Monitoring Frequency</u>
Pre-mining
VWPs recording pressure readings hourly. The system is telemetered so that data is transmitted continuously and can be accessed at any point in time.

During Mining
VWPs recording pressure readings hourly. The system is telemetered so that data is transmitted continuously and can be accessed at any point in time.

Post-mining
Continuous record of water level/pressure for a minimum of 12 months following the completion of active dewatering or as deemed necessary in consideration to the status of aquifer recovery or as required for future extraction activities.</td><td>Normal Condition</td><td></td><td></td></tr>
<tr><td>• No observable mining induced change at VWP intakes.
• Up to 5 m water level reduction in VWP intakes[1] following the commencement of extraction for a period of less than six months.</td><td>• Continue monitoring and review of data as per monitoring program.</td><td>• No response required.</td></tr>
<tr><td>Level 1</td><td></td><td></td></tr>
<tr><td>• Greater than 5 m water level reduction in VWP intakes[1] following the commencement of extraction for a period of greater than six months.</td><td>• Actions as required for Normal Condition.
• Undertake an investigation to assess cause and determine if mining related, commence/complete as soon as practicable.
• Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water level results).</td><td>• Report trigger exceedance to DPHI and key stakeholders.
• Report trigger exceedance and investigation outcomes in Annual Review.</td></tr>
<tr><td>Level 2</td><td></td><td></td></tr>
<tr><td>• Water level declines below the calculated Level 2 trigger – being the average of Level 1 (the ‘5 m drawdown’[1]) and Level 3 (the ‘maximum modelled drawdown’) – following the commencement of extraction for a period of greater than six months.
AND
• The reduction in water level is determined not to be controlled by climatic or external anthropogenic factors.</td><td>• Actions as stated in Level 1.
• Review deeper VWP data at monitored sites. Determine whether additional review of data is required. Determine if review of additional existing VWP sites is required.
• Consider increasing frequency of data review at sites where Level 2 has been reached or at other relevant sites.
Reasons for not increasing monitoring frequency could include confident identification causation that do not require further monitoring (e.g. singular anthropogenic impact resulting in water level change, or confirmed as a mining-related impact). Increased monitoring could be beneficial where commensurate responses in paired surface water monitoring locations have been observed.
• Compare against base case and deterministic model scenarios[2].
• Review Water Management Plan and modify if necessary.</td><td>• Responses as stated in Level 1.
• Advise DPHI and key stakeholders of any required amendments to Water Management Plan.</td></tr>
<tr><td>Level 3</td><td></td><td></td></tr>
<tr><td>• Water level reduction greater than the maximum modelled drawdown[1] following the commencement of extraction for a period of greater than six months.
AND
• The reduction in water level is determined not to be controlled by climatic or external anthropogenic factors.</td><td>• Actions as stated in Level 2.
• Increase review of data frequency for sites where Level 3 has been reached and the cause is unknown.
• Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing, other catchment changes, effect unrelated to mining or the prevailing climate). Commence/complete as soon as practicable
• Undertake investigative to review model results in conjunction with field data.</td><td>• Responses as stated in Level 2.</td></tr>
<tr><td colspan="4">Notes:
[1] Level 1, 2 and 3 triggers for water level reduction is provided in Table 6-4 in Appendix E of the Water Management Plan).
[2] “Deterministic” model scenario refers to the predictive scenario modelling utilised to determine the trigger level.</td></tr>
</table>

WATER MANAGEMENT PLAN TARP – WMP10 GROUNDWATER LEVEL / PRESSURE DEEP VWPS (> 200 m DEPTH EXCLUDING MONITORING THE BULLI COAL SEAM)

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Feature No performance measure relevant. **TARP Objective** This TARP defines levels of deviation in groundwater level from 'normal' or baseline conditions and the actions to be implemented in response to each level deviation. **Assessment Criteria** Bore specific trigger values based on modelled data for each reporting level. Model layers utilised to define predicted drawdown for each VWP logger provided in Table below.	**Locations** TBC009, TBC0018, TBC020, TBC026, TBC032, TBC033, TBC039 Reference sites: TBC027, TBC034, TBC038 Monitoring of all VWP > 200 m depth intakes excluding those monitoring the Bulli Coal Seam. All monitoring locations are shown in Figure 23 of the Water Management Plan. **Monitoring Frequency** **Pre-mining** VWPs recording pressure readings hourly. The system is telemetered so that data is transmitted continuously and can be accessed at any point in time. **During Mining** VWPs recording pressure readings hourly. The system is telemetered so that data is transmitted continuously and can be accessed at any point in time. **Post-mining** Continuous record of water level/pressure for a minimum of 12 months following the completion of active dewatering or as deemed necessary in consideration to the status of aquifer recovery or as required for future extraction activities.	**Normal Condition**		
		• Observed data does not exceed modelled impacts predicted drawdown by greater than 30 metres[1]. • Observed drawdown exceeds the modelled predicted drawdown[1], by greater than 30 metres for less than three consecutive months	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		• Observed drawdown exceeds the modelled predicted drawdown[1], by greater than 30 metres for greater than three consecutive months.	• *Actions as required for Normal Condition.* • Undertake an investigation to assess cause and determine if mining related to be commenced/completed as soon as practicable. • Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water level monitoring results).	• Report trigger exceedance to DPHI and key stakeholders. • Report trigger exceedance and investigation outcomes in Annual Review.
		Level 2		
		• Observed drawdown exceeds modelled predicted drawdown[1] by more than 30 metres greater than 6 consecutive months.	• *Actions as stated in Level 1.* • Consider increasing frequency of data review at sites where Level 2 has been reached or at other relevant sites. Reasons for not increasing monitoring frequency could include confident identification causation that do not require further monitoring (e.g. singular anthropogenic impact resulting in water level change, or confirmed as a mining-related impact). Increased monitoring could be beneficial where commensurate responses in paired surface water monitoring locations have been observed. Consider review data in conjunction with VWP data from additional existing VWP sites. • Compare against base case and deterministic model scenarios[2]. • Review Water Management Plan and modify if necessary.	• *Responses as stated in Level 1.* • Inclusion of more regional VWPs into data review to determine likely extent and depth of depressurisation. • Advise DPHI and key stakeholders of any required amendments to Water Management Plan.
		Level 3		
		• Observed drawdown exceeds modelled predicted drawdown[1] by 30 metres, for 12 consecutive months or more.	• *Actions as stated in Level 2.* • Increase review of data frequency for sites where Level 3 has been reached if the cause is unknown • Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing, other catchment changes, effect unrelated to mining or the prevailing climate). To be commenced/completed as soon as practicable. • Review base case and deterministic model scenarios[2] in conjunction with water pressure data and report findings.	• *Responses as stated in Level 2.*

Notes:
[1] Predicted drawdown refers to the drawdown as generated by the groundwater model and varies over time as extraction progresses. Observed drawdown will be plotted on a monthly basis against the predicted drawdown to determine if a trigger has occurred. Therefore, as the predicted drawdown will be constantly changing according to extraction progression, it is not possible to set a specific trigger limit.
[2] "Deterministic" model scenario refers to the predictive scenario modelling utilised to assess the trigger level.

Sensor	Model Layer	Model Geology	Sensor	Model Layer	Model Geology
TBC09_322	8	BUSS Mid	TBC26_344	8	BUSS Mid
TBC09_343	8	BUSS Mid	TBC26_409	13	WBCS
TBC09_357	12	SBSS Lower	TBC26_432	15	Bulli Seam
TBC09_381	10	SPCS	TBC26_440	16	Eckersley
TBC09_391	15	Bulli Seam	TBC26_460	16	Eckersley
TBC09_397	17	Wongawilli	TBC32_200	8	BUSS Mid
TBC18_282	8	BUSS Mid	TBC32_237	8	BUSS Mid

Performance Measure and Indicator, TARP Objective and Assessment Criteria			Monitoring Program			Management		
						Trigger	Action	Response
TBC18_366	80..0	BUSS Mid	TBC32_257	8	BUSS Mid			
TBC18_377	13	WBCS	TBC32_294	8	BUSS Mid			
TBC18_404	15	Bulli Seam	TBC32_314	8	BUSS Mid			
TBC18_426	17	Wongawilli	TBC33_247	8	BUSS Mid			
TBC18_432	17	Wongawilli	TBC33_306	8	BUSS Mid			
TBC20_211	8	BUSS Mid	TBC33_363	11	SBSS Upper			
TBC20_293	8	BUSS Mid	TBC33_384	16	Eckersley			
TBC20_375	8	BUSS Mid	TBC33_408	16	Eckersley			
TBC20_397	13	WBCS	TBC39_243	8	BUSS Mid			
TBC20_411	7	BUSS Upper	TBC39_299	8	BUSS Mid			
TBC20_434	17	Wongawilli	TBC39_354	11	SBSS Upper			
TBC20_439	4	HBSS Mid	TBC39_375	16	Eckersley			
TBC26_211	8	BUSS Mid	TBC39_402	16	Eckersley			
TBC26_278	8	BUSS Mid						

WATER MANAGEMENT PLAN TARP – WMP11 GROUNDWATER QUALITY (OPEN STANDPIPES AND PRIVATE BORES)

<table>
<tr><th rowspan="2">Performance Measure and Indicator, TARP Objective and Assessment Criteria</th><th rowspan="2">Monitoring Program</th><th colspan="3">Management</th></tr>
<tr><th>Trigger</th><th>Action</th><th>Response</th></tr>
<tr><td rowspan="8"><u>Performance Measure Feature</u>
No performance measure relevant.

<u>TARP Objective</u>
This TARP defines levels of deviation in groundwater level from ‘normal’ or baseline conditions and the actions to be implemented in response to each level deviation.
This TARP supports TARP WMP13, where groundwater quality as it pertains to groundwater dependent ecosystems (GDEs) (Thirlmere Lakes) is covered.

<u>Assessment Criteria</u>
Bore specific trigger values based on baselines data for each reporting level.</td><td rowspan="8"><u>Locations</u>
Open standpipes
Existing sites:
P51a, P51b, P52, REA4, P53a, P53b, P53c, P54a, P54b, P55a, P55b, P55c, P56a, P56b, P56c, P50a, P50b, P50c, P57a, P57b, P57c[2]

Private bores
GW109257, GW104008, GW112473, GW104659, GW104323

All monitoring locations are shown in Figure 23 of the Water Management Plan.

<u>Monitoring Frequency</u>
Pre-mining
Monthly water quality sampling.

During Mining
Monthly water quality sampling

Post-mining
Quarterly sampling and analysis for a minimum of 12 months following the completion of active dewatering or as deemed necessary in consideration to the status of aquifer recovery or as required for future extraction activities.

Water Quality sample parameters:
Field Parameters
PH
EC
TDS
DO
Laboratory Analysis
Total alkalinity as CaCO3, HCO3, CO3, DOC
Dissolved Major Cations (Ca, K, Na, Mg, F, Cl, SO4)
Dissolved Metals (Al, As, Ba, Co, Cu, Pb, Li, Mn, Ni, Se, Sr, Zn, Fe)
Total Metals (Al, As, Ba, Co, Cu, Pb, Li, Mn, Ni, Se, Sr, Zn, Fe)
Total Nitrogen
Total Phosphorus
Ionic Balance (Total Anions and Total Cations)</td><td colspan="3">Normal Condition</td></tr>
<tr><td>• No observable changes in salinity, pH or metals outside of the baseline variability.</td><td>• Continue monitoring and review of data as per monitoring program.</td><td>• No response required.</td></tr>
<tr><td colspan="3">Level 1</td></tr>
<tr><td>• Observed salinity and/or metals or pH outside of defined trigger levels[1] for 3 consecutive months or more. The effect does not persist after a significant rainfall recharge event.
AND
• A similar trend or response is noted at other monitored bores or private groundwater bores.</td><td>For Private Bores and Open Standpipe Monitoring Bores
• Actions as required for Normal Condition.
• Undertake an investigation to assess cause and determine if mining related.
• Undertake investigation to demonstrate if the change in quality will impact the long-term viability of the affected water supply works.
• Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water level results).
If the changes have been confirmed to be related to mining effects:
For Private Bores:
• Initiate negotiations with impacted landholders as soon as practicable. Consider all reasonable and feasible options for remediation as relevant. This could include potential for implementation of make-good provisions as per Section 6.2.1.4 of the Water Management Plan for affected private bore owners (e.g. provision of access to an alternative source of water).
For Open Standpipe Monitoring Bores
• For monitoring sites relevant to Thirlmere Lakes or associated with surface water monitoring sites, initiate groundwater – surface water interaction TARP.</td><td>For Private Bores and Open Standpipe Monitoring Bores
• Report trigger exceedance to DPHI and key stakeholders.
• Report trigger exceedance and investigation outcomes in Annual Review.
If the changes have been confirmed to be related to mining effects:
For Private Bores:
• Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for consultation (e.g. provision of access to an alternative source of water as detailed in Section 6.2.1.4 of the Water Management Plan).
• Implement CMAs, subject to land access.
• Monitor and report on success of CMAs in Annual Review.</td></tr>
<tr><td colspan="3">Level 2</td></tr>
<tr><td>• Observed salinity and/or metals or pH outside of defined trigger levels[1], for 3 consecutive months or more. The effect persists after a significant rainfall recharge event.
AND
• The change in water quality is determined not to be controlled by climatic or external anthropogenic factors.</td><td>For Private Bores and Open Standpipe Monitoring Bores
• Actions as stated in Level 1.
• Consider increasing frequency of monitoring and review of data at sites where Level 2 has been reached or at other relevant sites, subject to land access and feasibility.
Reasons for not increasing monitoring frequency could include confident identification causation that do not require further monitoring (e.g. singular anthropogenic impact resulting in water level change, or confirmed as a mining-related impact). Increased monitoring could be beneficial where commensurate responses in paired surface water monitoring locations have been observed
• Review Water Management Plan and modify if necessary.
For Private Bores:
• Review CMAs in light of findings from further investigations and consider additional reasonable and feasible options.</td><td>For Private Bores and Open Standpipe Monitoring Bores
• Responses as stated in Level 1.
• Advise DPHI and key stakeholders of any required amendments to Water Management Plan.
For Private Bores:
• Provide findings of CMA review to DPHI and key stakeholders for consultation.
• Implement additional CMAs, subject to land access.</td></tr>
<tr><td colspan="3">Level 3</td></tr>
<tr><td>• Observed salinity and/or metals or pH outside of defined trigger levels[1], for greater than 6 consecutive months.
AND
• The change in water quality is determined not to be controlled by climatic or external anthropogenic factors.</td><td>For Private Bores and Open Standpipe Monitoring Bores
• Actions as stated in Level 2.
• Increase monitoring and review of data frequency for sites where Level 3 has been reached, and cause is unknown, subject to land access.
• Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing, other catchment changes, effect unrelated to mining or the prevailing climate).</td><td>For Private Bores and Open Standpipe Monitoring Bores
• Responses as stated in Level 2.
For Private Bores:
If ascertained impact is due to mining activities and has potential to impact long-term viability of supply for private groundwater bores:
• Develop a Rehabilitation Management Plan in consultation with DPHI and landowner.
• Implement Rehabilitation Management Plan, subject to land access.</td></tr>
</table>

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
			• Undertake investigative report to demonstrate if the water quality change will impact the long-term viability of any affected water supply works.	
Notes: 1 Defined trigger levels for groundwater quality are listed in Table 6-5 of Appendix E of the Water Management Plan. 2 Trigger levels to be defined for P50 and P57 bores when suitable baseline data available				

WATER MANAGEMENT PLAN TARP – WMP12 GROUNDWATER - SURFACE WATER INTERACTION

<table>
<tr><th rowspan="2">Performance Measure and Indicator, TARP Objective and Assessment Criteria</th><th rowspan="2">Monitoring Program</th><th colspan="3">Management</th></tr>
<tr><th>Trigger</th><th>Action</th><th>Response</th></tr>
<tr><td rowspan="8"><u>Performance Measure Feature</u>
No performance measure relevant.

<u>TARP Objective</u>
This TARP defines levels of deviation in surface water - groundwater interactions from ‘normal’ conditions and the actions to be implemented in response to each level deviation.
The instigation of this TARP will be dictated by triggers exceedances in pertinent groundwater or surface water sites requiring further investigation of groundwater – surface water interactions.

Where groundwater – surface water connectivity indicates in a gaining stream, there is potential for groundwater supporting riparian vegetation. Consequently, Riparian vegetation in these situations could be a Groundwater Dependent Ecosystem (GDE), and the pertinent Performance Measure applicable:
Negligible impacts including:
• Negligible change in groundwater levels; and
• Negligible change in groundwater quality.

Riparian GDEs are addressed through the Riparian Vegetation TARP (BMP3). Consultation through the ERG will link this TARP (WMP12) to BMP3 via actions in BMP3 to consider groundwater – surface water relationships when pertinent.

<u>Assessment Criteria</u>
Bore specific trigger values based on baselines data for each reporting level. For this TARP, the aligned groundwater and surface water sites would be considered collectively to interpret potential changes/impacts to groundwater – surface water interaction.</td><td rowspan="8"><u>Locations</u>
Open standpipes
P51a, P51b, P52, REA4, P53a, P53b, P53c
P54a, P54b, P54c, P55a, P55b, P55c

The aligned surface water and groundwater sites are as follows:
• P51a, P51b with surface water site BR2-Qla
• P52, REA4 with surface water site-TT14-QLa
• P53a, P53b, P53c with surface water site-TT14-Qla
• P54a, P54b, P54c with surface water site TT3-QLa
• P55a, P55b, P55c with surface water site TT1-QLa

All monitoring locations are shown in Figure 23 of the Water Management Plan.

<u>Monitoring Frequency</u>
Pre-mining
Monthly manual measurements of water level and water quality.

During Mining
Monthly manual measurements of water level and water quality.

Post-mining
Continuous record (where loggers installed) and quarterly manual measurements of water level for a minimum of 12 months following the completion of active dewatering or as deemed necessary in consideration to the status of aquifer recovery or as required for future extraction activities.</td><td>Normal Condition</td><td></td><td></td></tr>
<tr><td>• Observed (or inferred where not immediately neighbouring a surface water site) groundwater and surface water interaction remains consistent with baseline variability and/pre-mining trends, and decrease in groundwater inflow not persisting after significant rainfall recharge events.</td><td>• Continue monitoring and review of data as per monitoring program.</td><td>• No response required.</td></tr>
<tr><td>Level 1</td><td></td><td></td></tr>
<tr><td>• Observed (or inferred where not immediately neighbouring a surface water site) groundwater levels at surface water monitoring site decline below Level 1 (in TARP WMP8) following the commencement of extraction.</td><td>• Actions as required for Normal Condition.
• Undertake an investigation to assess cause and determine if mining related.
• Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water level results).</td><td>• Report trigger exceedance to DPHI and key stakeholders.
• Report trigger exceedance and investigation outcomes in Annual Review.
If the changes have been confirmed to be related to mining effects:
• Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for consultation (e.g. extending the depth of the bore, establishment of additional bores, compensation to affected landowners as detailed in Section 6.2.1.4 of the Water Management Plan).
• Implement CMAs, subject to land access.
• Monitor and report on success of CMAs in Annual Review.</td></tr>
<tr><td>Level 2</td><td></td><td></td></tr>
<tr><td>• Observed (or inferred where not immediately neighbouring a surface water site) groundwater levels at aligned surface water monitoring site decline below Level 2 (in TARP WMP8) following the commencement of extraction.
AND
• The reduction in water level is determined not to be controlled by climatic or external anthropogenic factor.</td><td>• Actions as stated in Level 1.
• Consider increasing frequency of monitoring and review of data at sites where Level 2 has been reached or at other relevant sites, subject to land access and feasibility.
Reasons for not increasing monitoring frequency could include confident identification causation that do not require further monitoring (e.g. singular anthropogenic impact resulting in water level change, or confirmed as a mining-related impact).
• Compare against base case and deterministic model scenarios[1].
• Review manual water level measurements for additional monitoring sites to identify potential spatial trends in water level decline.
• Review surface water data to assess for surface water level decline at relevant site.
• Review CMAs in light of findings from further investigations and consider additional reasonable and feasible options.
• Review Water Management Plan and modify if necessary.</td><td>• Responses as stated in Level 1.
• Provide findings of CMA review to DPHI and key stakeholders for consultation.
• Implement additional CMAs, subject to land access.
• Advise DPHI and key stakeholders of any required amendments to Water Management Plan, including reporting on relationship of observations to baseline and deterministic model scenarios, as necessary.</td></tr>
<tr><td>Level 3</td><td></td><td></td></tr>
<tr><td>• Inferred groundwater levels at surface water monitoring site decline below Level 3 (in TARP WMP8) following the commencement of extraction.
AND
• The reduction in water level is determined not to be controlled by climatic or external anthropogenic factor.</td><td>• Actions as stated in Level 2.
• Increase frequency of data review for sites where Level 3 has been reached and cause is unknown, subject to land access.
• Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing, other catchment changes, effect unrelated to mining or the prevailing climate). Report to be commenced and completed as soon as practicable.</td><td>• Responses as stated in Level 2.
• Develop a Rehabilitation Management Plan in consultation with DPHI and key stakeholders.
• Implement Rehabilitation Management Plan, subject to land access.</td></tr>
<tr><td colspan="5">Notes:
1 [1]“Deterministic” model scenario refers to the predictive scenario modelling utilised to determine the trigger level.</td></tr>
</table>

WATER MANAGEMENT PLAN TARP – WMP13 GROUNDWATER BORES MONITORING FOR THIRLMERE LAKES

<table>
<tr><th rowspan="2">Performance Measure and Indicator, TARP Objective and Assessment Criteria</th><th rowspan="2">Monitoring Program</th><th colspan="3">Management</th></tr>
<tr><th>Trigger</th><th>Action</th><th>Response</th></tr>
<tr><td rowspan="8"><u>Performance Measure Feature</u>
GDEs including Thirlmere Lakes[1].

<u>Performance Measure</u>
Negligible impacts including:
• Negligible change in groundwater levels; and
• Negligible change in groundwater quality.

<u>Performance Indicator</u>
The performance measure will be considered to be exceeded if the groundwater levels or groundwater quality decline below Level 3 (in the relevant groundwater TARP triggers for water level and water quality – TARP WMP8 or WMP11) following the commencement of extraction, and the investigation outcomes indicate a mining related impact based on monitoring data for the Thirlmere Lakes.

<u>TARP Objective</u>
This TARP defines levels of deviation at Thirlmere Lakes from ‘normal’ conditions and the actions to be implemented in response to each level deviation.

<u>Assessment Criteria</u>
Bore specific trigger values based on baselines data for each reporting level.</td><td rowspan="8"><u>Locations</u>
“Early warning” bores
Existing sites:
GW104659, TBC039 (sensor at 65 metres in Hawkesbury Sandstone (HBSS)), P50a, P50b, P50c[2]
Thirlmere Lakes bores (not trigger bores)
Existing sites:
GW075409–1, GW075409–2, GW075410, GW075411 (paired with gauging station 212066)

All monitoring locations are shown in Figure 23 of the Water Management Plan.

<u>Monitoring Frequency (for “early warning” bores)</u>
Pre-mining
Monthly manual measurements of water level and water quality.

During Mining
Monthly manual measurements of water level and water quality.

Post-mining
Continuous record (where loggers installed) and quarterly manual measurements of water level for a minimum of 12 months following the completion of active dewatering or as deemed necessary in consideration to the status of aquifer recovery or as required for future extraction activities.

Water Quality sample parameters:
<table><tr><th>Field Parameters</th></tr><tr><td>PH
EC
TDS
DO</td></tr><tr><th>Laboratory Analysis</th></tr><tr><td>Total alkalinity as CaCO3, HCO3, CO3, DOC
Dissolved Major Cations (Ca, K, Na, Mg, F, Cl, SO4)
Dissolved Metals (Al, As, Ba, Co, Cu, Pb, Li, Mn, Ni, Se, Sr, Zn, Fe)
Total Metals (Al, As, Ba, Co, Cu, Pb, Li, Mn, Ni, Se, Sr, Zn, Fe)
Total Nitrogen
Total Phosphorus
Ionic Balance (Total Anions and Total Cations)</td></tr></table></td><td colspan="3">Normal Condition</td></tr>
<tr><td>• Groundwater levels and quality remain consistent with baseline variability and/pre-mining trends, and changes in groundwater levels/quality not persisting after significant rainfall recharge events.</td><td>• Continue monitoring and review of data as per monitoring program.</td><td>• No response required.</td></tr>
<tr><td colspan="3">Level 1</td></tr>
<tr><td>• Level 1 trigger of TARP WMP8 for a minimum of two “early warning” bores.
OR
• Level 1 trigger of TARP WMP11 for a minimum of two “early warning” bores.</td><td>• Actions as required for Normal Condition.
• Undertake an investigation to assess cause and determine if mining related.
• Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water level results).
If the changes have been confirmed to be related to mining effects:
• Consider all reasonable and feasible options for remediation as relevant (e.g. extending the depth of the bore, establishment of additional bores). This could include potential for implementation of make-good provisions as per Section 6.2.1.4 of the Water Management Plan for affected private bore owners.
• For monitoring sites relevant to Thirlmere Lakes or associated with surface water monitoring sites, initiate groundwater – surface water interaction TARP.</td><td>• Report trigger exceedance to DPHI and key stakeholders.
• Report trigger exceedance and investigation outcomes Annual Review.
If the changes have been confirmed to be related to mining effects:
• Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for consultation (e.g. extending the depth of the bore, establishment of additional bores, compensation to affected landowners as detailed in Section 6.2.1.4 of the Water Management Plan).
• Implement CMAs, subject to land access.
• Monitor and report on success of CMAs in Annual Review.</td></tr>
<tr><td colspan="3">Level 2</td></tr>
<tr><td>• Level 2 trigger of TARP WMP8 for a minimum of three bores “early warning” bores
OR
• Level 2 trigger of TARP WMP11 for a minimum of three bores (“early warning” bores and Thirlmere Lakes bores).</td><td>• Actions as stated in Level 1.
• Consider increasing frequency of monitoring and review of data at sites where Level 2 has been reached or at other relevant sites, subject to land access and feasibility.
Reasons for not increasing monitoring frequency could include confident identification causation that do not require further monitoring (e.g. singular anthropogenic impact resulting in water level change, or confirmed as a mining-related impact). Increased monitoring could be beneficial where commensurate responses in paired surface water monitoring locations have been observed
Review Thirlmere Lakes monitoring bore data
• Compare against base case and deterministic model scenarios[2].
• Review manual water level measurements for additional monitoring sites to identify potential spatial trends in water level decline.
• Review surface water data to assess for surface water level decline at relevant site.
• Review CMAs in light of findings from further investigations and consider additional reasonable and feasible options.
• Review Water Management Plan and modify if necessary.
• Undertake an investigation to determine if an exceedance of the performance measure is likely. To be commenced/completed as soon as practicable.</td><td>• Responses as stated in Level 1.
• Provide findings of CMA review to DPHI and key stakeholders for consultation.
• Implement additional CMAs, subject to land access.
• Advise DPHI and key stakeholders of any required amendments to Water Management Plan.
• If relevant, notify Commonwealth DCCEEW of any predictions of an exceedance of a performance measure within two business days.</td></tr>
<tr><td colspan="3">Exceeds Performance Measure</td></tr>
<tr><td>• Level 3 trigger of TARPs WMP8 for a minimum of four bores “early warning” bores)
OR
• Level 3 trigger of TARPs WMP11 for a minimum of four bores (“early warning” bores and Thirlmere Lakes bores).
AND
• Review of Thirlmere Lakes bores indicated potential impacts resulting from extraction</td><td>• Actions as stated in Level 2.
If the changes have been confirmed to be related to mining effects:
• Investigate reasons for the performance measure exceedance. To be commenced/completed as soon as practicable.
• Review predictions of subsidence impacts and environmental consequences associated with further longwall extraction based on the outcomes of the investigation.
• Consider modifying mine plan.</td><td>• Responses as stated in Level 2.
• Submit a report to DPHI (in accordance with Condition E4 of SSD 8445) within 14 days of the exceedance occurring (or other timeframe agreed by DPHI) describing remediation options and any preferred remediation measures or other course of action.
• Implement any reasonable remediation measures as directed by DPHI, subject to land access.
• Notify Commonwealth DCCEEW of any detection or predictions of an exceedance of a performance measure within two business days.</td></tr>
</table>

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
				• Submit an Impact Response Plan to Commonwealth DCCEEW (in accordance with Condition 11 of the DAWE (now Commonwealth DCCEEW) Consent for the Tahmoor South Project). • Update numerical groundwater model and re-run predictive scenarios to determine the likely extent and depth of depressurisation in the vicinity of Thirlmere Lakes, and to determine whether any additional management actions are required such as modifying the mine plan

Notes:
[1] It is noted that the only Groundwater Dependent Ecosystem (GDE) pertinent to the Tahmoor South Project is that of Thirlmere Lakes[2] "Deterministic" model scenario refers to the predictive scenario modelling utilised to determine the trigger level.
[2] Trigger levels for P50 bores to be developed when suitable baseline data available.

LAND MANAGEMENT PLAN TARP – LMP1 CLIFFS

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Feature Any cliff within Subsidence Area[1] beyond the extent of longwalls[2]. **Performance Measure** Negligible environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 0.5% of the total face area of such cliffs within Subsidence Area). **Performance Indicator** This performance measure will be considered to be triggered if more than 0.5% of the total face area of the cliffs within the 600 m Environmental Features Study Area is impacted by mining (e.g. by occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing). **TARP Objective** This TARP defines measures to manage potential impacts on cliff lines and the actions required to be implemented in response to exceedance of defined trigger levels. **Assessment Criteria** Extent of surface cracking, rockfalls, displacement or dislodgement of boulders or slabs observed.	**Locations** Cliffs (BC1 to BC20) within the 600 m Environmental Features Study Area as illustrated in Figure 3 of the Land Management Plan. **Monitoring Frequency** **Prior to the commencement of each panel** Visual inspection baseline by a geotechnical engineer, subject to land access Timing: - Cliff BC1 prior to LW S6A and LW S7A, - Cliff BC2 prior to LW S3A S4A, S5A and S6A, - Cliff BC3 to BC20 prior to LW S7A. **During Mining of each panel** None required (as the identified cliffs are located near the finishing ends of the longwalls). **At the completion of each panel**Visual inspection by a geotechnical engineer, subject to land access Timing: - Cliff BC1 prior to LW S6A and LW S7A, - Cliff BC2 prior to LW S3A S4A, S5A and S6A, - Cliff BC3 to BC20 prior to LW S7A. **Note: inspections can be combined depending in the timing between completion of panels and commencement of new panels**	**Normal Range of Condition**		
		• Surface cracking < 10 mm wide above the cliff line, on the cliff face, or in the underside of overhangs. AND/OR • No rockfalls, displacement or dislodgement of boulders or slabs observed.	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		• Surface cracking > 10 mm wide above the cliff line, on the cliff face, or in the underside of overhangs. AND/OR • No rockfalls, displacement or dislodgement of boulders or slabs observed.	• *Actions as required for Normal Condition.* • Undertake an investigation to assess cause and determine if mining related. • Discuss findings and obtain other relevant information from key specialises (e.g. subsidence monitoring results). If it is concluded that the cliff has been damaged by subsidence impacts: • Consider and decide on reasonable and feasible options to support the cliff line, where relevant (e.g. repairing cracks, installation of support (e.g. rockbolts)). • Erect hazard/warning signs and restrict access to areas where necessary. • Consider increasing monitoring and review of data frequency at sites where Level 1 has been reached, subject to land access. Considerations will take into account position of LW face relative to impact site, rate of longwall retreat, current weather conditions, development of conventional subsidence above longwall, consequences of potential cliff instability and monitoring results relevant to the cliff locations.	• Report trigger exceedance to DPHI and key stakeholders. • Report trigger exceedance and investigation outcomes in the Annual Review. • Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for consultation (e.g. repairing cracks, installation of support). • Implement CMAs, subject to land access. • Monitor and report on success of CMAs in the Annual Review.
		Level 2		
		• Rockfalls, collapse of overhang, displacement or dislodgement of boulders or slabs observed.	• *Actions as stated in Level 1.* • Determine the percentage area of impacted area relative to the total face area. • Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing, or the effect is unrelated to mining such as environmental effects, tree root jacking). If it is concluded that cliff line has been damaged by subsidence impacts: • Increase frequency of monitoring by geotechnical consultant during active subsidence period at sites where Level 2 has been reached, subject to land access. Considerations will take into account position of LW face relative to impact site, rate of longwall retreat, current weather conditions, development of conventional subsidence above longwall, consequences of potential cliff instability and monitoring results relevant to the cliff locations. • Notify and consult with affected landowner(s). • Review CMAs in light of findings from further investigations and consider additional reasonable and feasible options. • Review Land Management Plan and modify if necessary. • Undertake an investigation to determine if an exceedance of the performance measure is likely.	• *Responses as stated in Level 1.* If it is concluded that cliffs have been damaged by subsidence impacts: • Offer site visit with DPHI and key stakeholders. • Develop a Rehabilitation Management Plan in consultation with DPHI and key stakeholders if relevant. • Notify Commonwealth DCCEEW of any predictions of an exceedance of a performance measure (if relevant) within two business days. • Provide findings of CMA review to DPHI and key stakeholders for consultation. • Implement additional CMAs, subject to land access. • Advise DPHI and key stakeholders of any required amendments to Land Management Plan.
		Exceeds Performance Measure		
		• More than 0.5% of the total face area of the cliffs within the 600 m Environmental Features Study Area is impacted due to mining (e.g. by occasional rockfalls, displacement or dislodgement of boulders or slabs, or fracturing).	• *Actions as stated in Level 2.* • Investigate reasons for the performance measure exceedance. • Review predictions of subsidence impacts and environmental consequences associated with further longwall extraction based on the outcomes of the investigation. • Consider modifying mine plan for future longwalls located near cliffs.	• *Responses as stated in Level 2.* • Submit a report to DPHI (in accordance with Condition E4 of SSD 8445) within 14 days of the exceedance occurring (or other timeframe agreed by DPHI) describing remediation options and any preferred remediation measures or other course of action. • Implement reasonable remediation measures as directed by DPHI, subject to land access. • Notify Commonwealth DCCEEW of any detection or predictions of an exceedance of a performance measure within two business days.

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	Action	Response
				• Submit an Impact Response Plan to Commonwealth DCCEEW (in accordance with Condition 11 of the DAWE (now Commonwealth DCCEEW) Consent for the Tahmoor South Project).

Notes:
[1] Subsidence Area is defined as the 'Subsidence Study Area' as illustrated in Figure 1 of Appendix 2 of SSD 8445.
[2] It is noted that there are no cliff lines located directly above Longwalls S1A-S7A. Therefore, the performance measure for 'Any cliff located directly above longwalls' is not relevant.

LAND MANAGEMENT PLAN TARP – LMP2 NATURAL STEEP SLOPE (EXCLUDING CONSTRUCTED STEEP SLOPES ASSOCIATED WITH ROADS, RAILWAY AND THE TAHMOOR MINE SITE)

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Feature All land within the Subsidence Area[1,2]. **Performance Measure** No greater subsidence impact or environmental consequences than predicted in the EIS[3]. **Performance Indicator** This performance measure will be considered to be triggered if mining results in mine subsidence-induced slope instability, which would be a greater subsidence impact or consequence than predicted in the EIS. **TARP Objective** This TARP defines measures to manage potential impacts on natural steep slopes[4,5] and the actions required to be implemented in response to exceedance of defined trigger levels. **Assessment Criteria** Extent of surface cracking and stepping, ground bulging, buckling and shearing for steep slopes[4].	**Locations** Natural steep slopes (RS1 to RS7 and WC1 to WC3) Locations of natural steep slopes shown in Figure 3 of the Land Management Plan. **Monitoring Frequency** **Prior to the commencement of each panel** Visual inspection baseline one month before active subsidence period by a geotechnical engineer, subject to land access. **During mining of each panel** Monthly visual inspection during active subsidence period by a geotechnical engineer, subject to land access. **At the completion of each panel** Quarterly visual inspection for 12 months following active subsidence period by a geotechnical engineer, or as required in accordance with a Rehabilitation Management Plan, subject to land access. **Note: inspections can be combined depending in the timing between completion of panels and commencement of new panels**	**Normal Range of Condition**		
		• Discontinuous surface cracking < 10 mm wide on steep slope (e.g. other than natural desiccation cracking). AND/OR • No localised ground bulging, buckling or shearing.	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		• Persistent[6] surface cracking 10 - 20 mm, or stepping (including shearing) across a crack 10 – 20 mm high on steep slope. AND/OR • Localised ground bulging or buckling (between 100 – 200 mm) is observed on steep slope.	• *Actions as required for Normal Condition.* • Geotechnical consultant inspection to assess cause and determine need for further action/investigation. • Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results). If it is concluded that the slope has been damaged by subsidence impacts: • Consider and decide on reasonable and feasible options for remediation as relevant (e.g. backfilling or grout filling of surface cracking, re-profiling of compression humps). • Erect warning signs and restrict access to areas where necessary. • Consider increasing monitoring and review of data frequency at sites where Level 1 has been reached, subject to land access. Considerations will take into account position of LW face relative to impact site, rate of longwall retreat, current weather conditions, development of conventional subsidence above longwall, consequences of potential slope instability and monitoring results relevant to the steep slope locations. • Consider additional specific monitoring at the impact site and implement if feasible and effective.	• Report trigger exceedance to DPHI and key stakeholders. • Report trigger exceedance and investigation outcomes in Annual Review. • Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for consultation (e.g. backfilling or grout filling of surface cracking, re-profiling of compression humps, re-direct drainage) • Implement CMAs, subject to land access. • Monitor and report on success of CMAs in Annual Review.
		Level 2		
		• Persistent[5] surface cracking > 20 mm wide or stepping > 20 mm high on slope. AND/OR • Localised ground bulging or buckling > 200 mm is observed on steep slope. AND/OR • Slope instability < 300 m^3 is observed or assessed as likely by a geotechnical engineer based on the extent of surface cracking or deformation.	• *Actions as stated in Level 1.* • Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced cracking, or the effect is unrelated to mining such as wet weather or other environmental effects). If it is concluded that the slope has been damaged by subsidence impacts: • Increase frequency of monitoring by geotechnical consultant during active subsidence period at sites where Level 2 has been reached, subject to land access. Considerations will take into account position of LW face relative to impact site, rate of longwall retreat, current weather conditions, development of conventional subsidence above longwall, consequences of potential slope instability and monitoring results relevant to the steep slope locations. • Assess potential for slope instability (and if an exceedance of the performance measure is possible). • Consider actions to avoid or reduce the likelihood and/or consequence of slope instability and implement if feasible and effective. • Notify and consult with affected landowner(s). • Review CMAs with regards to the findings from further investigations and consider additional remediation options. • Review Land Management Plan and modify if necessary.	• *Responses as stated in Level 1.* If it is concluded that the slope has been damaged by subsidence impacts: • Offer site visit with DPHI and key stakeholders. • Develop a Rehabilitation Management Plan in consultation with DPHI and key stakeholders if relevant. • Notify Commonwealth DCCEEW of any predictions of an exceedance of a performance measure (if relevant) within two business days. • Provide findings of CMA review to DPHI and key stakeholders for consultation. • Implement additional CMAs, subject to land access. • Advise DPHI and key stakeholders of any required amendments to Land Management Plan.
		Exceeds Performance Measure		
		• Subsidence-induced impacts or environmental consequences that result in slope instability > 300 m^3.	• *Actions as stated in Level 2.* • Investigate reasons for the performance measure exceedance. • Review predictions of mine subsidence impacts and environmental consequences associated with further longwall extraction based on the outcomes of the investigation.	• *Responses as stated in Level 2.* • Submit a report to DPHI (in accordance with Condition E4 of SSD 8445) within 14 days of the exceedance occurring (or other timeframe agreed with DPHI) describing temporary protection measures and long-term remediation options and any preferred remediation measures or other course of action. • Implement reasonable remediation measures as directed by DPHI, subject to land access. • Notify Commonwealth DCCEEW of any detection or predictions of an exceedance of a performance measure within two business days.

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	Action	Response
				• Submit an Impact Response Plan to Commonwealth DCCEEW (in accordance with Condition 11 of the DAWE (now Commonwealth DCCEEW) Consent for the Tahmoor South Project).

Notes:
[1] Subsidence Area is defined as the 'Subsidence Study Area' as illustrated in Figure 1 of Appendix 2 of SSD 8445.
[2] Steep slopes are defined as greater than 18.4°. There are three steep slopes identified within the 600 m Environmental Features Study Area that are also located within the Subsidence Area[1]. As no other steep slopes have been identified within the 600 m Environmental Features Study Area, the performance measure for 'all land outside the subsidence area' is not relevant.
[3] EIS predictions are summarised in the Subsidence Predictions and Impact Assessment Report by MSEC (2022) and MSEC (2024), and the relevant predictions for steep slopes is provided in Section 4.2 of the Land Management Plan.
[4] All road embankments and road cutting identified in Figure 3 of the Land Management Plan will be managed in accordance with the Wollondilly Shire Council Management Plan. All railway embankments within the Study Area will be managed in accordance with the Main Southern Railway Management Plan. All steep slopes on the Tahmoor Mine Site will be managed in accordance with the Tahmoor Mine Site Management Plan.
[5] TARPs for the management of constructed steep slopes will be provided as part of the Wollondilly Shire Council Management Plan (road embankments and cuttings), Main Southern Railway Management Plan (rail embankments) and the Tahmoor Mine Site Management Plan (mine site slopes). These yet to be prepared TARPs will be included in Appendix B Master TARP following preparation and approval by the infrastructure owner.
[6] For the purpose of this TARP, persistent cracking is a tension crack/s that combine to form a potential backscarp or failure plane for slope instability. The length is proportional to the size of the failure surface.

LAND MANAGEMENT PLAN TARP – LMP3 FARM DAMS

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Feature Other privately-owned built features and improvements, including… farm dams. **Performance Measure** • Always safe. • Serviceability should be maintained wherever practicable. • Loss of serviceability must be fully compensated. • Damage must be fully repairable, and must be fully investigated and repaired or else replaced or fully compensated at the cost of the Applicant. **Performance Indicator** This performance measure will be considered to be triggered if mining results in damage to a farm dam such that the dam is not safe and serviceable and/or any damages cannot be fully repairable and/or compensated. **TARP Objective** This TARP defines measures to manage potential impacts on farm dams and the actions required to be implemented in response to exceedance of defined trigger levels. **Assessment Criteria** Dam embankment integrity, water level and seepage observations.	**Locations** Identified farm dams within the Study Area (FD1 to FD45). Locations shown in Figure 8 of the Land Management Plan. **Monitoring Frequency** **Prior to the commencement of each panel** Dam embankment integrity and water level observation by a geotechnical consultant one month before active subsidence period using fixed location photo points. **During mining of each panel** Dam embankment integrity and water level observation every month during the active subsidence period by a geotechnical consultant, using fixed location photo points, subject to land access. **At the completion of each panel** Dam embankment integrity and water level observation using fixed location photo points on a quarterly basis for 12 months following completion of active subsidence by a geotechnical consultant, or as required in accordance with a Rehabilitation Management Plan. **Note: inspections can be combined depending in the timing between completion of panels and commencement of new panels**	**Normal Range of Condition**		
		• No cracks develop within dam embankment (e.g. other than natural desiccation cracking).	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		• Development of isolated cracks (> 10 mm wide) within the dam wall (e.g. other than natural desiccation cracking). AND/OR • Development of isolated seepage without suspended solids (e.g. clear water) from the face or toe of the farm dam embankment.	• *Actions as required for Normal Condition.* • Geotechnical consultant inspection to assess cause and determine need for further action/investigation. • Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results). If it is concluded that dam has been damaged by subsidence impacts: • Consider and decide on reasonable and feasible options for remediation as relevant (e.g. backfilling surface cracking, reinstatement). • Notify and consult with affected landowner. • Erect warning signs and restrict access to areas where necessary and permitted by the landowner.	• Report trigger exceedance to DPHI, SA NSW and key stakeholders. • Report trigger exceedance and investigation outcomes in Annual Review. • Provide DPHI, SA NSW and landowner with proposed corrective management actions (CMAs) for consultation (e.g. backfilling surface cracking, reinstatement). • Implement CMAs, subject to land access. • Monitor and report on success of CMAs in Annual Review.
		Level 2		
		• Development of persistent longitudinal or arcuate cracking within dam wall > 20 mm. AND • Development of seepage with suspended solids (e.g. turbid water) from the face or toe of the farm dam embankment.	• *Actions as stated in Level 1.* • Consider increasing monitoring and review of data frequency at sites where Level 2 has been reached, subject to land access. Considerations will take into account position of LW face relative to impact site, rate of longwall retreat, current weather conditions, development of conventional subsidence above longwall, consequence of potential dam break, and monitoring results relevant to the dam locations. • Review CMAs in light of findings from further investigations and consider additional reasonable and feasible options. • Review Land Management Plan and modify if necessary. • Geotechnical Consultant to advise on the need for a reduction in the dam water level (e.g. half dam volume) to reduce the risk of a dam break failure.	• *Responses as stated in Level 1.* • Advise DPHI, SA NSW and key stakeholders of any required amendments to Land Management Plan. • Provide findings of CMA review to DPHI, SA NSW and landowner for consultation. • Implement additional CMAs, subject to land access.
		Level 3		
		• Development of persistent longitudinal or arcuate cracking within dam wall > 20 mm. AND • Subsidence monitoring identifies subsidence-induced impacts or environmental consequences that result in any slope instability to the farm dam embankment.	• *Actions as stated in Level 2.* • Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing, or the effect is unrelated to mining such as environmental effects). If it is concluded that the dam has been damaged by subsidence impacts: • Increase frequency of monitoring by geotechnical consultant during active subsidence period at sites where Level 3 has been reached, subject to land access. Considerations will take into account position of LW face relative to impact site, rate of longwall retreat, current weather conditions, development of conventional subsidence above longwall, consequence of potential dam break, and monitoring results relevant to the dam locations. • Reduction of dam water level in accordance with advice from Geotechnical Consultant. • Review predictions of mine subsidence impacts and environmental consequences associated with further longwall extraction based on the outcomes of the investigation. • Assess potential for the safety and serviceability of the dam to be lost (and if an exceedance of the performance measure is possible).	• *Responses as stated in Level 2.* If it is concluded that the dam has been damaged by subsidence impacts: • Offer site visit with DPHI and key stakeholders. • Repair or replace farm dam in consultation with DPHI and SA NSW and landowner. • Provide alternate water supply for landowner, if required. • Notify Commonwealth DCCEEW of any predictions of an exceedance of a performance measure (if relevant) within two business days.

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
		Exceeds Performance Measure		
		• Mining results in damage to a farm dam such that the dam is not safe and serviceable and/or any damages cannot be fully repairable and/or compensated.	• *Actions as stated in Level 3.* • Investigate reasons for the performance measure exceedance. • Review predictions of mine subsidence impacts and environmental consequences associated with further longwall extraction based on the outcomes of the investigation.	• *Responses as stated in Level 3.* • Submit a report to DPHI (in accordance with Condition E4 of SSD 8445) within 14 days of the exceedance occurring (or other timeframe agreed with DPHI) describing temporary protection measures and long-term remediation options and any preferred remediation measures or other course of action. • Implement reasonable remediation measures as directed by DPHI, subject to land access. • Notify Commonwealth DCCEEW of any detection or predictions of an exceedance of a performance measure within two business days. • Submit an Impact Response Plan to Commonwealth DCCEEW (in accordance with Condition 11 of the DAWE (now Commonwealth DCCEEW) Consent for the Tahmoor South Project).

LAND MANAGEMENT PLAN TARP – LMP4 AGRICULTURAL LAND

<table>
<tr><th rowspan="2">Performance Measure and Indicator, TARP Objective and Assessment Criteria</th><th rowspan="2">Monitoring Program</th><th colspan="3">Management</th></tr>
<tr><th>Trigger</th><th>Action</th><th>Response</th></tr>
<tr><td rowspan="6"><u>Performance Measure Feature</u>
No performance measures relevant.

<u>TARP Objective</u>
This TARP defines measures to manage potential impacts on agricultural land and the actions required to be implemented in response to exceedance of defined trigger levels.

<u>Assessment Criteria</u>
Changes to agricultural land such as to impact the use of the land for agricultural productivity[1].</td><td rowspan="6"><u>Locations</u>
Identify agricultural land uses within the Study Area (refer to Figure 8 in the Land Management Plan).

<u>Monitoring Frequency</u>
Pre-mining
Visual inspection prior to the commencement of mining from fixed photo points.

During Mining
Weekly inspections along local roads. Monthly inspections of farm dams by a geotechnical consultant, subject to land access.

Post-mining
Visual inspection at the completion of each longwall for land within the predicted limit of subsidence for each longwall.</td><td colspan="3">Normal Condition</td></tr>
<tr><td>• Negligible impact to agricultural productivity or use of land, negligible effects from mining-induced changes in slope (tilt) on ponding / flooding (reversal of natural slope), or increase in soil / tunnel erosion (increase in slope).</td><td>• Continue monitoring and review of data as per monitoring program.</td><td>• No response required.</td></tr>
<tr><td colspan="3">Level 1</td></tr>
<tr><td>• Minor impact to agricultural land from subsidence resulting in increased flooding or ponding within predicted impacts.
AND/OR
• Minor impact to drainage systems due to increased ponding / flooding or increased soil / tunnel erosion that can be remediated.
AND/OR
• Surface cracking affecting safety of livestock.</td><td>• Actions as required for Normal Condition.
• Undertake an investigation to assess cause and determine if mining related.
• Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water monitoring results).
• Consider and decide on reasonable and feasible options for remediation as relevant (e.g. adjustment of farm gate levels, fence tensioning, backfilling of surface cracking).
• Consider increasing monitoring and review of data frequency at sites where Level 1 has been reached, subject to land access. Considerations will take into account position of LW face relative to impact site, rate of longwall retreat, current weather conditions, development of conventional subsidence above longwall, consequences of further impacts on agricultural land use and monitoring results relevant to the agricultural land.</td><td>• Report trigger exceedance to DPHI and key stakeholders.
• Report trigger exceedance and investigation outcomes in Annual Review.
• Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for consultation (e.g. adjustment of farm gate, fence tensioning, backfilling of surface cracking).
• Implement CMAs, subject to land access.
• Monitor and report on success of CMAs in Annual Review.</td></tr>
<tr><td colspan="3">Level 2</td></tr>
<tr><td>• Significant impact and change to agricultural land functionality or agricultural productivity greater than predicted (e.g. excessive subsidence and mining-induced changes in slope (tilt), resulting in substantial ponding / flooding (reversal in natural slope), excessive soil / tunnel erosion (increase in slope), or excessive surface cracking affecting safety of livestock that require livestock to be relocated from a property in order to rehabilitate the land.</td><td>• Actions as stated in Level 1.
• Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing, or the effect is unrelated to mining such as environmental effects).
If it is concluded that agricultural land has been damaged by subsidence impacts:
• Increase frequency of monitoring during active subsidence period at sites where Level 2 has been reached, subject to land access. Considerations will take into account position of LW face relative to impact site, rate of longwall retreat, current weather conditions, development of conventional subsidence above longwall, consequences of further impacts on agricultural land use and monitoring results relevant to the agricultural land.
• Review CMAs in light of findings from further investigations and consider additional reasonable and feasible options.
• Review Land Management Plan and modify if necessary.</td><td>• Responses as stated in Level 1.
If it is concluded that the agricultural land has been damaged by subsidence impacts:
• Offer site visit with DPHI and key stakeholders.
• Develop a Rehabilitation Management Plan in consultation with DPHI and key stakeholders if relevant.
• Provide findings of CMA review to DPHI and key stakeholders for consultation.
• Implement additional CMAs, subject to land access.
• Advise DPHI and key stakeholders of any required amendments to Land Management Plan.</td></tr>
<tr><td colspan="6">Notes:
[1] It is noted that the management of rural structures used for agricultural and farming purposes located in the Study Area are discussed in the Built Features Management Plan (e.g. poultry sheds, greenhouses, greenhouses, hothouses, irrigation systems, and tanks), the Water Management Plan (e.g. watercourses and groundwater bores), and the separate TARP for farm dams as part of this Land Management Plan.</td></tr>
</table>

BIODIVERSITY MANAGEMENT PLAN TARP – BMP1 AQUATIC HABITAT AND MACROINVERTEBRATE INDICATORS (STREAM HEALTH)

<table>
<tr><th rowspan="2">Performance Measure and Indicator, TARP Objective and Assessment Criteria</th><th rowspan="2">Monitoring Program</th><th colspan="3">Management</th></tr>
<tr><th>Trigger</th><th>Action</th><th>Response</th></tr>
<tr><td rowspan="8"><u>Performance Measure Feature</u>
Aquatic habitat and stream health.

<u>Performance Measure</u>
Negligible environmental consequences to aquatic and riparian ecosystems beyond those predicted in the EIS[1].

<u>Performance Indicator</u>
This performance measure will be considered to be triggered if subsidence impacts cannot be remediated in a manner that restores aquatic habitat.

<u>TARP Objective</u>
This TARP defines levels of deviation in aquatic habitat and associated stream health from normal conditions and the actions required to be implemented in response to each level of deviation.

<u>Assessment Criteria</u>
Reduction in aquatic habitat through loss of pools or associated reduction in stream health (AUSRIVAS assessment).</td><td rowspan="8"><u>Locations</u>
• AUSRIVAS stream health sampling at aquatic ecology monitoring sites HC6, HC7, HC8, TTHt9, TTH12, TTH13, TTH16, TTHt17, BRt6.
• Quantitative macroinvertebrate sampling at aquatic ecology monitoring sites HC6, HC7, HC8, TTHt9, BRt6, TTH12, TTH13, MC14, MC15.

Refer to Figure 9 of the Biodiversity Management Plan for the location of aquatic ecology monitoring sites.

<u>Monitoring Frequency</u>
Pre-mining
Bi-annually (Spring and Autumn).

During Mining
Bi-annually (Spring and Autumn).

Post-mining
Bi-annually (Spring and Autumn) for 12 months following the completion of LW S7A or as required in accordance with a Rehabilitation Management Plan and/or if required to monitor a corrective management action(s).</td><td colspan="3">Normal conditions</td></tr>
<tr><td>• Visual monitoring indicates aquatic pool habitat parameters are similar to baseline observations at aquatic ecology monitoring sites.
AND
• AUSRIVAS score equal to or greater than Band C.</td><td>• Continue monitoring and review of data as per monitoring program.</td><td>• No response required.</td></tr>
<tr><td colspan="3">Level 1</td></tr>
<tr><td>• Visual monitoring indicates reduction in aquatic pool habitat compared to baseline observations at aquatic ecology monitoring sites for two consecutive sampling occasions.
OR
• AUSRIVAS score of Band D recorded for two consecutive sampling occasions at one or more aquatic ecology monitoring site(s).</td><td>• Actions as required for Normal Condition.
• Undertake an investigation of BACI quantitative macroinvertebrate data to assess Level 1 observations and determine if mining related or the response to environmental conditions (e.g. drought) within the catchment.
• Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water monitoring results, groundwater monitoring results).
• Consider and decide on reasonable and feasible options for remediation, where relevant (e.g. limestone cobble for pH management).
• Following investigation, any declines detected that are not attributable to mining impacts (e.g. are a result of environmental conditions or stochastic events) are to be considered ‘normal condition’ and are continued to be included in the ongoing development of the ecological monitoring dataset.</td><td>• Report trigger exceedance to DPHI and key stakeholders.
• Report trigger exceedance and investigation outcomes in Annual Review.
• Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for consultation (e.g. limestone cobbles for pH management).
• Implement CMAs, subject to land access.
• Monitor and report on success of CMAs in Annual Review.
• Continue monitoring to determine if a Level 2 TARP trigger will occur.</td></tr>
<tr><td colspan="3">Level 2</td></tr>
<tr><td>• Visual monitoring indicates reduction in aquatic pool habitat compared to baseline observations at aquatic ecology monitoring sites for three consecutive sampling occasions.
OR
• AUSRIVAS score of Band D recorded for three consecutive sampling occasions at one or more aquatic ecology monitoring site(s).</td><td>• Actions as stated in Level 1.
• Consider increasing monitoring and review of data frequency where Level 2 has been reached and at other relevant sites, subject to land access.
• Consider the inclusion of additional sites within impact area.
• Review CMAs in light of findings from further investigations and consider additional reasonable and feasible options.
• Review Biodiversity Management Plan and modify if necessary.</td><td>• Responses as stated in Level 1.
• Provide findings of CMA review to DPHI and key stakeholders for consultation.
• Implement additional CMAs, subject to land access.
• Advise DPHI and key stakeholders of any required amendments to Biodiversity Management Plan.
• Continue monitoring to determine if a Level 3 TARP trigger will occur.</td></tr>
<tr><td colspan="3">Level 3</td></tr>
<tr><td>• Visual monitoring indicates reduction in aquatic pool habitat compared to baseline observations at aquatic ecology monitoring sites for four consecutive sampling occasions.
OR
• AUSRIVAS score of Band D recorded for four consecutive sampling occasions at one or more aquatic ecology monitoring site(s).</td><td>• Actions as stated in Level 2.
• Increase monitoring frequency for sites where Level 3 has been reached and at corresponding reference sites, subject to land access.
• Add additional monitoring sites as required.
• Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing, other catchment changes, effects unrelated to mining or the prevailing climate).
• Undertake an investigation to determine if an exceedance of the performance measure is likely.</td><td>• Responses as stated in Level 2.
If it is concluded that pools/aquatic habitat have been damaged by subsidence impacts:
• Offer site visit with DPHI and key stakeholders.
• If relevant, notify Commonwealth DCCEEW of any predictions of an exceedance of a performance measure within two business days.
• Develop a Rehabilitation Management Plan in consultation with DPHI and key stakeholders.
• Implement Rehabilitation Management Plan, subject to land access.
• Continue monitoring to determine if an exceedance of the performance measure will occur.</td></tr>
<tr><td colspan="3">Exceeds Performance Measure</td></tr>
<tr><td>• Structural integrity of the bedrock base of permanent pools or controlling rockbars in third order and above reaches of Teatree Hollow and Teatree Hollow tributary and/or pool TT2 cannot be restored e.g. pool holding capacity is not reinstated to pre-mining conditions after WCAMP completion.</td><td>• Actions as stated in Level 3.
• Investigate reasons for the performance measure exceedance.
• Review predictions of subsidence impacts and environmental consequences associated with further longwall extraction based on the outcomes of the investigation.</td><td>• Responses as stated in Level 3.
• Submit a report to DPHI (in accordance with Condition E4 of SSD 8445) within 14 days of the exceedance occurring (or other timeframe agreed by DPHI).
• Implement reasonable remediation measures as directed by DPHI, subject to land access.</td></tr>
</table>

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
				• Notify Commonwealth DCCEEW of any detection or predictions of an exceedance of a performance measure within two business days. • Submit an Impact Response Plan to Commonwealth DCCEEW (in accordance with Condition 11 of the DAWE (now Commonwealth DCCEEW) Consent for the Tahmoor South Project).
Notes: [1] EIS predictions for aquatic habitat are summarised in Table 19 of the Biodiversity Management Plan.				

BIODIVERSITY MANAGEMENT PLAN TARP – BMP2 AMPHIBIAN POPULATIONS

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Feature No performance measures relevant. **TARP Objective** This TARP defines levels of deviation in amphibian populations and habitat from normal conditions and the actions required to be implemented in response to each level of deviation. **Assessment Criteria** • Decline in amphibian populations (species abundance and richness) attributed to mining effects. • The presence of a significant interaction (P-value <0.05) between Before/After and Control/Impact indicates an effect on amphibian assemblages[1,2].	**Locations** Amphibian monitoring and photo-point monitoring at all amphibian monitoring sites (sites i01-i03, i09 and c04-c08). Refer to Figure 10 of the Biodiversity Management Plan for the location of amphibian monitoring sites. **Monitoring Frequency** **Pre-mining** Bi-annually (Spring and Autumn). **During Mining** Bi-annually (Spring and Autumn). **Post-mining** Bi-annually (Spring and Autumn) for 12 months following the completion of LW S7A or as required in accordance with a Rehabilitation Management Plan and/or if required to monitor a corrective management action(s).	**Normal Condition**		
		• Monitoring indicates amphibian populations (richness and abundance) are stable[3] and habitat parameters are predominantly within a reasonable range of baseline data (supported by statistical analyses).	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		• Monitoring indicates amphibian populations (species abundance) have reduced significantly below baseline values[4].	• *Actions as required for Normal Condition.* • Undertake an investigation of quantitative/qualitative monitoring data to assess the cause and determine if differences are mining related or are in the response to environmental conditions (e.g. drought) within the catchment. Cross check biodiversity monitoring data against other related environmental data (e.g. aquatic monitoring results or subsidence monitoring results) upon identification of the potential trigger. • Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water monitoring results, groundwater monitoring results). • Investigate whether any surface water TARP indicators have been triggered. • Consider and decide on reasonable and feasible options for remediation, where relevant. • Following investigation, any significant differences detected that are not attributable to mining impacts (e.g. are a result of environmental conditions or stochastic events) are to be considered 'normal condition' and are continued to be included in the ongoing development of the ecological monitoring dataset.	• Report trigger exceedance to DPHI and key stakeholders. • Report trigger exceedance and investigation outcomes in Annual Review. • Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for consultation. • Implement CMAs, subject to land access. • Monitor and report on success of CMAs Annual Review. • Continue monitoring to determine if a Level 2 TARP trigger will occur.
		Level 2		
		• Monitoring indicates amphibian populations (species abundance and richness) have reduced significantly below baseline values[4] over two consecutive sampling seasons that, following investigation, is attributed to mining impacts[5].	• *Actions as stated in Level 1.* • Consider increasing monitoring and review of data frequency where Level 2 has been reached and at other relevant sites, subject to land access. • Consider the addition of monitoring sites within impact area. • Review CMAs in light of findings from further investigations and consider additional reasonable and feasible options. • Review Biodiversity Management Plan and modify if necessary.	• *Responses as stated in Level 1.* • Provide findings of CMA review to DPHI and key stakeholders for consultation. • Implement additional CMAs, subject to land access. • Advise DPHI and key stakeholders of any required amendments to Land Management Plan. • Continue monitoring to determine if a Level 3 TARP trigger will occur.
		Level 3		
		• Monitoring indicates amphibian populations (species abundance and richness) have reduced significantly below baseline values[4] over four consecutive sampling seasons that, following investigation, is attributed to mining impacts[5].	• *Actions as stated in Level 2.* • Increase monitoring and review of data frequency for sites where Level 3 has been reached and at other relevant sites, subject to land access. • Consider the addition of monitoring sites within impact area, where relevant. • Undertake a detailed investigation to assess if the change in behaviour is related to mining effects.	• *Response as stated in Level 2.* If it is concluded that amphibian habitat have been damaged by subsidence impacts: • Develop a Rehabilitation Management Plan in consultation with DPHI and key stakeholders. • Implement Rehabilitation Management Plan, subject to land access.
Notes:				

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	Action	Response

[1] Multivariate statistical analyses have been performed to test whether there is a difference between frog assemblages at future control and impact (using the baseline data). The non-significant interaction (P-value of >/= 0.05) between Control/Impact sites indicates that established future Control and Impact sites are suitable for mining and post-mining monitoring purposes, as they support similar amphibian assemblages (taxa and numbers of individuals), and similar microhabitats.

[2] Baseline amphibian surveys did not identify the presence of Red-crowned Toadlet (*Pseudophryne australis*) (listed as Vulnerable under the BC Act) or Giant Burrowing Frog (*Heleioporus australiacus*) (listed as Vulnerable under the BC Act and EPBC Act) within the LW S1A-S7A Study Area. Red-crowned Toadlet was recorded within the Study Area for LW S1A–S7A during the Tahmoor Amphibian Monitoring Program in 2013, during which the Giant Burrowing Frog was also recorded outside the Study Area for LW S1A–S7A. Giant Burrowing Frog was recorded at Cow Creek, and Red-crowned Toadlet was recorded at Hornes Creek (Niche, 2018a). Neither species has been recorded within the Study Area for LW S1A–S7A since the commencement of biannual (Spring and Autumn) amphibian monitoring that has been ongoing since 2013. If recorded in the future during amphibian monitoring, the presence of threatened frog species would be reported, and further investigations will be initiated to determine ongoing presence of threatened species in the locality and assess whether updates to the BMP and associated TARPs are required.

[3] Stable is defined as no significant interaction between Before/After and Control/Impact indicating the mining activity has not affected amphibian assemblages (which comprises of all detected amphibian species recorded during monitoring surveys).

[4] Determined by BACI interaction analyses. Significantly below baseline values is determined to be a P-value result of less than or equal to 0.05 for Before, After, either/or Control and Impact groups. The detection of a significant interaction between Before/After and Control/Impact indicates the mining activity has an effect on amphibian assemblages. All detected amphibian species are to be recorded during monitoring surveys. The amphibian data will be subject to statistical hypothesis testing. Species richness and abundance are population metrics used to assess amphibian populations in the locality.

[5] Mining impacts results in a decline in water quantity or quality influencing habitats.

BIODIVERSITY MANAGEMENT PLAN TARP – BMP3 RIPARIAN VEGETATION

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Feature 1. Aquatic habitat. 2. GDEs including Thirlmere Lakes[1]. **Performance Measure** 1. Negligible environmental consequences to aquatic and riparian ecosystems beyond those predicted in the EIS[2]. 2. Negligible impacts including: • Negligible change in groundwater levels; and • Negligible change in groundwater quality. **Performance Indicator** 1. This performance measure will be considered to be triggered if subsidence impacts cannot be remediated in a manner that restores habitat. 2. The performance measure will be considered to be exceeded if the groundwater levels or groundwater quality decline below Level 3 (in the relevant groundwater TARP triggers for water level and water quality – TARP WMP8 or WMP11) following the commencement of extraction, and the investigation outcomes indicate a mining related impact based on monitoring data for riparian vegetation. **TARP Objective** This TARP defines levels of deviation in riparian vegetation condition from normal conditions and the actions required to be implemented in response to each level of deviation. **Assessment Criteria** Dieback and reduced condition of riparian vegetation community within the Study Area.	**Locations** Permanent floristic plots, vegetation condition assessment, photo-point monitoring and plant taxonomy at all riparian vegetation monitoring sites (sites i01-i03, i09 and c04-c08). Refer to Figure 10 of the Biodiversity Management Plan for the location of monitoring sites. **Monitoring Frequency** **Pre-mining** Bi-annually (Spring and Autumn). **During Mining** Bi-annually (Spring and Autumn). **Post-mining** Bi-annually (Spring and Autumn) for 12 months following the completion of LW S7A or as required in accordance with a Rehabilitation Management Plan and/or if required to monitor a corrective management action(s).	**Normal Condition**		
		• Monitoring indicates riparian vegetation parameters are predominantly within a reasonable range of baseline data[3], specifically that Vegetation Integrity (VI) scores are within 10% of baseline. AND • Monitoring indicates native vegetation cover (percent cover) is within a reasonable range of baseline data[4].	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		• Monitoring indicates the VI score has reduced further than 10 % of average baseline score, over two consecutive sampling event (and cannot be attributed to climatic conditions or natural attrition). AND • Monitoring indicates native vegetation cover (percent cover) has reduced significantly below baseline values[4] over two consecutive sampling event.	• *Actions as required for Normal Condition.* • Undertake an investigation of quantitative/qualitative data to assess the cause and determine if mining related or the response to environmental conditions (e.g. drought) within the catchment. • Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water monitoring results, groundwater monitoring results). • Consider and decide on reasonable and feasible options for remediation, where relevant. • Following investigation, any significant differences detected that are not attributable to mining impacts (e.g. are a result of environmental conditions or stochastic events) are to be considered 'normal condition' and are continued to be included in the ongoing development of the ecological monitoring dataset.	• Report trigger exceedance to DPHI and key stakeholders. • Report trigger exceedance and investigation outcomes in Annual Review. • Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for consultation. • Implement CMAs, subject to land access. • Monitor and report on success of CMAs in Annual Review. • Continue monitoring to determine if a Level 2 TARP trigger will occur.
		Level 2		
		• Monitoring indicates the VI score has reduced further than 10 % of baseline score, over four consecutive sampling event (and cannot be attributed to climatic conditions or natural attrition). AND • Monitoring indicates native vegetation cover (percent cover) has reduced significantly below baseline values[4].	• Actions as stated in Level 1. • Consider increasing monitoring and review of data frequency where Level 2 has been reached and at other relevant sites, subject to land access. • Consider the addition of monitoring sites within impact area. • Review CMAs in light of findings from further investigations and consider additional reasonable and feasible options. • Review Biodiversity Management Plan and modify if necessary.	• *Responses as stated in Level 1.* • Provide findings of CMA review to DPHI and key stakeholders for consultation. • Implement additional CMAs, subject to land access. • Advise DPHI and key stakeholders of any required amendments to Land Management Plan. • Continue monitoring to determine if a Level 3 TARP trigger will occur.
		Level 3		
		• Monitoring indicates the VI score has reduced further than 10 % of baseline score, over six consecutive sampling event (and cannot be attributed to climatic conditions or natural attrition). AND • Monitoring indicates native vegetation cover (percent cover) has reduced significantly below baseline values[4] over six consecutive sampling events.	• *Actions as stated in Level 2.* • Increase monitoring and review of data frequency for sites where Level 3 has been reached and at other relevant sites, subject to land access. • Consider the addition of monitoring sites within impact area, where relevant. • Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing, other catchment changes, effect unrelated to mining or the prevailing climate). • Undertake an investigation to determine if an exceedance of the performance measure is likely.	• *Response as stated in Level 2.* If it is concluded that riparian habitat have been damaged by subsidence impacts: • Offer site visit with DPE and key stakeholders. • Develop a Rehabilitation Management Plan in consultation with DPHI and key stakeholders. • Implement Rehabilitation Management Plan, subject to land access. • If relevant, notify Commonwealth DCCEEW of any predictions of an exceedance of a performance measure within two business days. • Continue monitoring to determine if an exceedance of the performance measure will occur.

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
		Exceeds Performance Measure		
		• This performance measure will be triggered if subsidence impacts cannot be remediated in a manner that restores habitat. AND/OR • A mining related impact has occurred to riparian vegetation (Level 3 triggered of this TARP) and a Level 3 TARP trigger has occurred for groundwater levels or groundwater quality (Level 3 of TARP WMP8 or WMP11) in a corresponding location.	• *Actions as stated in Level 3.* • Investigate reasons for the performance measure exceedance. • Review predictions of subsidence impacts and environmental consequences associated with further longwall extraction based on the outcomes of the investigation. • Consider modifying mine plan.	• *Responses as stated in Level 3.* • Submit a report to DPHI (in accordance with Condition E4 of SSD 8445) within 14 days of the exceedance occurring (or other timeframe agreed by DPHI). • Implement reasonable remediation measures as directed by DPHI, subject to land access. • Notify Commonwealth DCCEEW of any detection or predictions of an exceedance of a performance measure within two business days. • Submit an Impact Response Plan to Commonwealth DCCEEW (in accordance with Condition 11 of the DAWE (now Commonwealth DCCEEW) Consent for the Tahmoor South Project).

Notes:

[1] Where groundwater – surface water connectivity indicates a gaining stream, there is potential for riparian vegetation to be supported by groundwater. Consequently, riparian vegetation in these situations could be a Groundwater Dependent Ecosystem (GDE). Discussion of findings through the Tahmoor Coal Environmental Response Group will enable linkage of this TARP to WMP12 to consider groundwater – surface water relationships when pertinent.

[2] EIS predictions for riparian vegetation are summarised in Table 18 of the Biodiversity Management Plan.

[3] No significant interaction between Before/After and Control/Impact indicating the mining activity has not affected riparian assemblages.

[4] Determined by BACI interaction analyses. Significantly below baseline values is determined to be a P-value result of less than or equal to 0.05 for Before, After, either/or Control and Impact groups. The detection of a significant interaction between Before/After and Control/Impact indicates the mining activity has an effect on riparian assemblages.

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Feature Threatened species, threatened populations, or endangered ecological communities. **Performance Measures** No greater subsidence impacts or environmental consequences than predicted in the EIS[1]. Negligible impacts on threatened species, populations, or communities due to remediation of subsidence cracking. **Performance Indicator** This performance measure will be triggered if subsidence impacts cannot be remediated in a manner that restores habitat. **TARP Objective** This TARP defines levels of deviation in Shale Sandstone Transition Forest (STFF) TEC and threatened flora species from normal conditions and the actions required to be implemented in response to each level of deviation. **Assessment Criteria** Decline or significant negative change in condition class of the TEC and threatened flora species (e.g. *Pomaderris brunnea*, *Persoonia bargoensis* and *Grevillea parviflora* subsp. *parviflora*). This TARP excludes the monitoring of threatened fauna species and habitat[2,3].	**Locations** Permanent floristic plots within the 600 m buffer study area, subject to land access. Refer to Figure 10 of the Biodiversity Management Plan for the location of monitoring sites. **Monitoring Frequency** **Pre-mining** Annually **During Mining** Bi-annually (Spring and Autumn). **Post-mining** Bi-annually (Spring and Autumn) for 12 months following the completion of LW S7A or as required in accordance with a Rehabilitation Management Plan and/or if required to monitor a corrective management action(s).	**Normal Condition**		
		• Monitoring indicates STFF TEC parameters are within a reasonable range of average baseline data (Vegetation Integrity (VI) scores are within reasonable range of baseline [within 10 %]). AND • Monitoring indicates target threatened flora species[4] numbers are stable (within reasonable range of baseline numbers).	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		• Monitoring indicates the VI score has reduced further than 10 % of average baseline score. AND/ OR • Monitoring indicates target threatened flora species[4] are in decline or signs dieback are evident.	• *Actions as required for Normal Condition.* • Undertake an investigation of quantitative/qualitative data to assess the cause and determine if mining related or the response to environmental conditions (e.g. drought) within the catchment. • Discuss findings and obtain other relevant information from key specialists (e.g. subsidence monitoring results, surface water monitoring results, groundwater monitoring results). • Consider and decide on reasonable and feasible options for remediation, where relevant.	• Report trigger exceedance to DPHI and key stakeholders. • Report trigger exceedance and investigation outcomes in Annual Review. • Provide DPHI and key stakeholders with proposed corrective management actions (CMAs) for consultation. • Implement CMAs, subject to land access. • Monitor and report on success of CMAs in Annual Review. • Continue monitoring to determine if a Level 2 TARP trigger will occur.
		Level 2		
		• Monitoring indicates the VI score has reduced further than 10 % of the average baseline VI score, over two consecutive sampling events. AND/ OR • Monitoring indicates target threatened flora species[4] are in decline or visual signs of dieback are continued, over two consecutive sampling seasons.	• *Actions stated in Level 1.* • Consider increasing monitoring and review of data frequency where Level 2 has been reached and at other relevant sites, subject to land access. • Consider the addition of monitoring sites within impact area. • Review CMAs in light of findings from further investigations and consider additional reasonable and feasible options. • Review Biodiversity Management Plan and modify if necessary.	• *Responses as stated in Level 1.* • Provide findings of CMA review to DPHI and key stakeholders for consultation. • Implement additional CMAs, subject to land access. • Advise DPHI and key stakeholders of any required amendments to Land Management Plan. • Continue monitoring to determine if a Level 3 TARP trigger will occur.
		Level 3		
		• Monitoring indicates the VI score has reduced further than 10 % of baseline score, over four consecutive sampling event. AND/ OR • Monitoring indicates target threatened flora species[4] are in decline or visual signs of dieback are continued, over four consecutive sampling seasons.	• *Actions as stated in Level 2.* • Increase monitoring and review of data frequency to fortnightly at sites where Level 3 has been reached and at other relevant sites, subject to land access. • Consider the addition of monitoring sites within impact area, where relevant. • Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g. whether there has been subsidence induced fracturing, other catchment changes, effect unrelated to mining or the prevailing climate). • Undertake an investigation to determine if an exceedance of the performance measure is likely.	• *Response as stated in Level 2.* If it is concluded that threatened species, habitats or endangered ecological communities have been damaged by subsidence impacts: • Offer site visit with DPHI and key stakeholders. • Develop a Rehabilitation Management Plan in consultation with DPHI and key stakeholders. • Implement Rehabilitation Management Plan, subject to land access. • If relevant, notify Commonwealth DCCEEW of any predictions of an exceedance of a performance measure within two business days. • Continue monitoring to determine if an exceedance of the performance measure will occur.
		Exceeds Performance Measure		
		• Subsidence impacts cannot be remediated in a manner that restores habitat for TECs, or threatened flora.	• *Actions as stated in Level 3.* • Investigate reasons for the performance measure exceedance. • Review predictions of subsidence impacts and environmental consequences associated with further longwall extraction based on the outcomes of the investigation.	• *Responses as stated in Level 3.* • Submit a report to DPHI (in accordance with Condition E4 of SSD 8445) within 14 days of the exceedance occurring (or other timeframe agreed by DPHI). • Implement reasonable remediation measures as directed by DPHI, subject to land access. • Notify Commonwealth DCCEEW of any detection or predictions of an exceedance of a performance measure within two business days. • Submit an Impact Response Plan to Commonwealth DCCEEW (in accordance with Condition 11 of the DAWE (now Commonwealth DCCEEW) Consent for the Tahmoor South Project).

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	Action	Response

Notes:

[1] EIS predictions for threatened species, threatened populations and endangered ecological communities are summarised in Section 4.1 of the Biodiversity Management Plan.

[2] Baseline amphibian surveys did not identify the presence of Red-crowned Toadlet (*Pseudophryne australis*) (listed as Vulnerable under the BC Act) or Giant Burrowing Frog (*Heleioporus australiacus*) (listed as Vulnerable under the BC Act and EPBC Act) within the LW S1A-S7A Study Area. Red-crowned Toadlet was recorded within the Study Area for LW S1A–S7A during the Tahmoor Amphibian Monitoring Program in 2013, during which the Giant Burrowing Frog was also recorded outside the Study Area for LW S1A–S7A. Giant Burrowing Frog was recorded at Cow Creek, and Red-crowned Toadlet was recorded at Hornes Creek (Niche, 2018a). Neither species has been recorded within the Study Area for LW S1A–S7A since the commencement biannual (Spring and Autumn) amphibian monitoring that has been ongoing since 2013. If recorded in the future during amphibian monitoring, the presence of threatened frog species would be reported, and further investigations will be initiated to determine ongoing presence of threatened species in the locality and assess whether updates to the BMP and associated TARPs are required.

[3] During the 2020 biodiversity surveys, there were 11 threatened fauna species encountered within the LW S1A-S7A Study Area (Niche 2020a). Potential habitat for these species within the Tahmoor South EIS Project Area, includes riparian hollow-bearing trees, potential overhangs (only two cliff lines are being monitored within the project area), and disused buildings. No caves were encountered during surveys completed by Niche, nor have any caves been reported by MSEC (2018; 2022; 2024). Furthermore, cliff line environments which may indicate cave-like habitat, are generally limited to the Nepean River to the north of the Study Area with some scattered cliff lines along the Dogtrap Creek, and Hornes Creek. Given the cliffs are located outside the predicted limit of subsidence as a result of the extraction of LW S1A-S7A, the probability that cave roosting habitat would be impacted is very low. Furthermore, no hollow-bearing trees, bridges or culverts within the Study Area that provide roosting habitat for threatened bats are likely to be substantially impacted by subsidence. As such, roosting habitat for threatened microbats is unlikely to be impacted by the extraction of LW S1A-S7A. Subsidence is unlikely to affect any resources or habitat features on which these species depend such that it would result in any measurable changes to their breeding or foraging behaviour or habitat. Further, individuals have not been incidentally encountered during other baseline monitoring surveys (irregular occurrence in the study area). Therefore, as these threatened fauna species are considered highly mobile (consisting of bats and birds) and the species (and habitat) is considered unlikely to be impacted by mining practices, they have not been addressed further in the biodiversity TARPs.[4] Threatened flora species monitored are *Pomaderris brunnea*, *Persoonia bargoensis* and *Grevillea parviflora* subsp. *Parviflora*.

HERITAGE MANAGEMENT PLAN TARP – HMP1 ABORIGINAL CULTURAL HERITAGE SITES

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Feature Aboriginal cultural heritage sites (listed in Appendix 4 of SSD 8445). Aboriginal cultural heritage sites (listed in Appendix D of SSD 8445 Mod 3). **Performance Measure** No greater subsidence impacts or loss of heritage values than predicted in the EIS and/or MOD[1]. **Performance Indicator** **Open camp site (Remembrance Drive 2013.1) and Isolated find (TC14-2-19)** No performance indicators are currently established as impacts are predicted to be negligible[2]. **Rockshelters with art and deposit, art, deposit or artefacts and deposit(Teatree Hollow 2013.1, Hornes Creek RS2, Hornes Creek RS3, Hornes Creek RS4, Hornes Creek RS5, Hornes Creek RS6, Hornes Creek RS7)** This performance measure will be considered to be triggered if more than 10% of rockshelters (i.e. more than two) in the Tahmoor South Domain (including A and B series longwalls) are impacted by: • subsidence monitoring identifies obvious perceptible change, e.g. rockfall, cracking, or toppling within rockshelters; and • these subsidence impacts result in impacts to the heritage values of the site, e.g. cracking, spalling or collapse of the art work panels that result in damage or loss of the art. This performance measure cannot be exceeded during the extraction of the A series longwalls, even if the above-mentioned performance indicators are fully triggered for Teatree Hollow 2013.1. Such impacts would not exceed the 10% threshold of impacts to the 19 total rockshelters in the longwalls A and B Study Area. **Grinding groove site** This performance indicator will be considered to be triggered if cracks (>2 cm) or movement in excess of natural environmental change occur as a result of Tahmoor South Domain (including A and B series longwalls). Impacts include: • subsidence monitoring identifies obvious perceptible change, e.g. cracking, spaces, gaps of movement of joints and rock associated with the grinding grooves; and • these subsidence impacts result in impacts to the heritage values of the site. This performance measure cannot be exceeded during the extraction of the A series longwalls. This performance measure and performance indicator have been incorporated into TARP HMP1 (Aboriginal cultural heritage sites).	**Locations** Teatree Hollow 2013.1. Hornes Creek RS2 Hornes Creek RS3 Hornes Creek RS4 Hornes Creek RS5 Hornes Creek RS6 Hornes Creek RS7 Hornes Creek GG1 Location shown in Figure 3 of the Heritage Management Plan. Monitoring of stone artefact sites Remembrance Drive 2013.1 and TC14-2-19 is not required as impacts are not anticipated. **Monitoring Frequency** **Pre-mining** • Visual inspection by archaeologist with RAPs (completed for Teatree Hollow 2013.1, to be completed for Hornes Creek RS2-RS7 inclusive and Hornes Creek GG1). • Baseline recording, sampling and photogrammetry (completed for Teatree Hollow 2013.1, to be completed for Hornes Creek RS2-RS7 inclusive and Hornes Creek GG1). Structural geotechnical review prior to secondary workings Teatree Hollow 2013.1. **During Mining** Teatree Hollow 2013.1 • Fortnightly visual inspection of the rockshelter (monitoring overall rockshelter stability) during periods of active subsidence for LW S1A, S2A, S3A and S4A, to be completed from a safe distance. • Monitoring of GNSS units / survey lines in proximity to the rockshelter (refer to Subsidence Monitoring Plan for more detail), reviewed on a monthly basis during periods of active subsidence for LW S1A, S2A, S3A and S4A. Hornes Creek RS2-RS7 inclusive, and Hornes Creek GG1 • Monthly visual inspection of the rockshelters and grinding grooves by a geotechnical engineer (PSM) (monitoring overall rockshelter and grinding groove stability) during periods of active subsidence for LW S7A, to be completed from a safe distance. • Monitoring of GNSS units / survey lines in proximity to the rockshelter and Grinding grooves (refer to Subsidence Monitoring Plan for more detail), reviewed on a monthly basis during periods of active subsidence for LW S7A. **Post-mining** Teatree Hollow 2013.1	**Normal Condition**		
		• Aboriginal heritage site monitoring indicates no detectable environmental consequences.	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		Aboriginal heritage site monitoring indicates potential detectable environmental consequences, but with negligible impacts to the heritage value of rockshelter sites[3], and Hornes Creek GG1[4].	• *Actions as required for Normal Condition.* • An archaeologist to inspect the site within the area of potential impact and confirm Level 1 trigger is correct and that art panels have not been affected. • Detailed photographic recording of any damage to be documented and marked on the shelter base plan. • Undertake an investigation to assess cause and determine if mining related. • Consider and decide on reasonable and feasible options for remediation as relevant which could form corrective management actions (CMAs) in consultation with an archaeologist and RAPs. Engage specialists where relevant to address impact types (e.g. consult an engineer to discuss management of rockfall or toppling of shelter). • Consider increasing monitoring and review of data frequency if it is determined that the shelter structural stability or art panels are at an increased risk of impact from the Level 1 trigger event, subject to land access. • Review Heritage Management Plan and modify if necessary.	• Report trigger exceedance to DPE and key stakeholders. • Notify RAPs within seven days of the event and co-ordinate a site inspection with at least one RAP representative. • Report trigger exceedance and investigation outcomes in Annual Review. • Provide DPE, RAPs, and Heritage NSW with proposed corrective management actions (CMAs) for consultation (e.g. structural support for shelter or additional measures for art panels in response to level of increased risk of impacts). • Consider the development of a Rehabilitation Management Plan, and/or an update to the Heritage Management Plan in consultation with DPE, Heritage NSW and RAPs and key stakeholders (e.g. if additional mitigation or alternative methods not covered in the Heritage Management Plan are proposed). • Implement CMAs. • Monitor and report on success of CMAs in Annual Review. • Advise DPE and key stakeholders of any required amendments to Heritage Management Plan.
		Level 2		
		Aboriginal heritage site monitoring indicates environmental consequences to rockshelter sites[5] and Hornes Creek GG1[6].	• *Actions as stated in Level 1.* Increase monitoring and review of data frequency for sites where Level 2 has been reached at rockshelter sites and/or and Hornes Creek GG1, subject to land access • Investigate exceedance of subsidence prediction. • Review mine design/predictions against mine criteria.	• *Responses as stated in Level 1.* If it is concluded that heritage items have been damaged by subsidence impacts: • Offer site visit with DPE and key stakeholders. • Develop a Rehabilitation Management Plan in consultation with DPE and key stakeholders. Developed CMAs are to be incorporated into this plan. • Implement Rehabilitation Management Plan, subject to land access.

TARP Objective This TARP defines levels of impacts to Aboriginal cultural heritage values from existing conditions identified at the time of their discovery, to indicators that subsidence impacts have or may occur, to indicators of exceedance of the performance measure and the actions required to be implemented in response to each level of impact or exceedance of the performance measure. **Assessment Criteria** Discussion of performance measure indicators and their definitions is provided in Section 4.1.2 and Section 5.1 of the Heritage Management Plan.	• Visual inspection by archaeologist with RAPs at the completion of LW S1A, S2A, S3A and S4 Hornes Creek RS2-RS7 inclusive, and Hornes Creek GG1 • Visual inspection by archaeologist with RAPs at the completion of LW S7A.			

Notes:
[1] EIS predictions for aboriginal cultural heritage sites summarised in Section 4.1 of the Heritage Management Plan.
[2] Subsidence movements are not expected to have observable effects on these two sites as they are located in open terrain with a very gently sloping gradient. The predicted likelihood of impact on artefact sites is considered extremely unlikely and subsidence movements are unlikely to constitute 'harm' as defined by the NPW Act. As such, these sites will not be monitored and therefore performance measures cannot be established.
[3] Visible perceptible change, such as rockfall, cracking, or toppling within the rockshelter similar to naturally caused examples and which does not impact the art panels.
[4] Visible perceptible change, such as cracking, gaps, or broader rock movement similar to naturally caused examples and which does not impact the grooves.
[5] Visible perceptible change that results in impacts to the heritage values of the site, such as cracking, spalling or collapse of the art work panels that result in damage or loss of the art.
[6] Visible perceptible change that results in impacts to the heritage values of the site, such as cracking and/or gaps intersecting with a groove feature, and/or movement of the rock exposure that result in damage or loss of the art.

HERITAGE MANAGEMENT PLAN TARP – HMP2 HISTORICAL HERITAGE ITEMS

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Feature Historic heritage sites (listed in Appendix 4 of SSD 8445). **Performance Measure** No greater subsidence impacts or loss of heritage values than predicted in the EIS[1]. **Performance Indicator** This performance measure will be considered to be triggered if subsidence impacts cannot be repaired in a manner that preserves the heritage value of the historical heritage items (Wirrimbirra Sanctuary, Bargo Cemetery, Bargo Railway Bridge North, Picton Weir, Tahmoor Mine Site, Bargo Railway Viaduct, Great Southern Road (partial)). **TARP Objective** This TARP defines levels of impacts to historic heritage sites from existing conditions identified at the time of their recording as part of the project EIS, to indicators that subsidence impacts have or may occur, to indicators of exceedance of the performance measure and the actions required to be implemented in response to each level of impact or exceedance of the performance measure. **Assessment Criteria** The historic heritage values related to each site are based on significance assessment criteria adopted as part of the EIS for the project (Niche 2012). TARP assesses impacts in relation to the historically significant values of each heritage item. The significance of each item is summarised in Table 12 of the Heritage Management Plan.	**Locations** • Wirrimbirra Sanctuary (Australian Wildlife Sanctuary). • Bargo Cemetery. • Bargo Railway Bridge North (Wellers Road Overbridge). • Picton Weir. • Tahmoor Colliery (Tahmoor Mine Site). • Bargo Railway Viaduct. • Great Southern Road (partial). Locations of historical heritage items are shown in Figure 4 of the Heritage Management Plan. **Monitoring Frequency** **Wirrimbirra Sanctuary** Pre-mining: • Visual assessment by a heritage consultant as part of SoHI (completed). • Pre-mining condition and structural assessment as per the Australian Wildlife Sanctuary Management Plan. • Install monitoring system as per the Subsidence Monitoring Plan. During mining: Regular monitoring as per the Australian Wildlife Sanctuary Management Plan. Post-mining: • Visual inspection by a heritage consultant at the completion of LW S5A. • Inspections and assessments as per the Australian Wildlife Sanctuary Management Plan. **Bargo Cemetery** Pre-mining: • Baseline recording and visual assessment by heritage consultant (completed, see Appendix D). • Pre-mining assessments as per the Bargo Cemetery Management Plan. • Install monitoring system as per the Subsidence Monitoring Plan. During mining: Regular monitoring as per the Bargo Cemetery Management Plan. Post-mining: • Visual inspection by a heritage consultant at the completion of Longwalls LW S7A. • Inspections and assessments as per the Bargo Cemetery Management Plan. **Bargo Railway Bridge North** Pre-mining: • Visual assessment by a heritage consultant. • Pre-mining condition and structural assessment as per the Main Southern Railway Management Plan. • Install monitoring system as per the Subsidence Monitoring Plan. During mining: Regular monitoring as per the Main Southern Railway Management Plan. Post-mining: • Visual inspection by a heritage consultant at the completion of Longwalls LW S7A. • Inspections and assessments as per the Main Southern Railway Management Plan. **Picton Weir** Pre-mining: • Pre-mining condition and structural assessment as per the Picton Weir Management Plan. • Install monitoring system as per the Subsidence Monitoring Plan. During mining: Regular monitoring as per the Picton Weir Management Plan. Post-mining: Inspections and assessments as per the Picton Weir Management Plan. **Tahmoor Colliery** Pre-mining: • Pre-mining condition and structural assessment as per the Tahmoor Mine Site Management Plan. • Install monitoring system as per the Subsidence Monitoring Plan. During mining: Regular monitoring as per the Tahmoor Mine Site Management Plan. Post-mining: Inspections and assessments as per the Tahmoor Mine Site Management Plan. **Great Southern Road (partial)** Pre-mining: Pre-mining condition as per the Wollondilly Shire Council Management Plan. During mining: Regular monitoring as per the Wollondilly Shire Council Management Plan. Post-mining: Inspections and assessments as per the Wollondilly Shire Council Management Plan. **Bargo Railway Viaduct**	**Normal Condition**		
		• Historical heritage site monitoring indicates no detectable environmental consequences.	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		• Historical heritage site monitoring indicates potential detectable environmental consequences, but with negligible impacts to the heritage value of the heritage site(s).	• *Actions as required for Normal Condition.* • Co-ordinate a site inspection with a structural engineer. • Consult with a qualified archaeologist or heritage architect to determine whether impacts to heritage sites have occurred. • Consider increasing monitoring and review of data frequency for sites subject to a Level 1 trigger event, subject to land access. • Detailed photographic recording of any damage to be documented. • Erect warning signs and restrict access to areas where necessary.	• Report trigger exceedance to DPE and Heritage NSW. • Report trigger exceedance and investigation outcomes in Annual Review.
		Level 2		
		• Historical heritage site monitoring indicates environmental consequences to heritage site(s) but to a level that could be repaired in a manner that preserves the heritage value of the site(s).	• *Actions as stated in Level 1.* • Consider and decide on reasonable and feasible options for remediation as relevant which could form corrective management actions (CMAs) that would result in the repair of the item to a level that preserves the heritage value of the site(s). • Increase monitoring and review of data frequency for sites subject to a Level 2 trigger event, subject to land access. • Review Heritage Management Plan and modify if necessary. • Investigate exceedance of subsidence prediction. • Review mine design/predictions against mine criteria (e.g. for Picton Weir – review environmental consequences after extraction of LW S5A and determine if LW S6A should be shortened). • Undertake an investigation to determine if an exceedance of the performance measure is likely.	• *Responses as stated in Level 1.* • Advise DPE and key stakeholders of any required amendments to Heritage Management Plan. If it is concluded that heritage items have been damaged by subsidence impacts: • Offer site visit with DPE and Heritage NSW. • Provide DPE and Heritage NSW with proposed corrective management actions (CMAs) for consultation. • Implement CMAs, subject to land access. • Monitor and report on success of CMAs in Annual Review. • If relevant, notify DAWE of any predictions of an exceedance of a performance measure within two business days.
		Exceeds Performance Measure		
		• This performance measure will be considered to be triggered if subsidence impacts cannot be repaired in a manner that preserves the heritage value of the historic heritage item.	• *Actions as stated in Level 2.* • Investigate reasons for the performance measure exceedance. • Engage heritage specialist to determine if impacts to the heritage values of the site are irreparable even after reasonable remediation attempts have been made under the TARP. • Review predictions of subsidence impacts and environmental consequences associated with further longwall extraction based on the outcomes of the investigation. • Consider modifying mine plan.	• *Responses as stated in Level 2.* • Submit a report to DPE (in accordance with Condition E4 of SSD 8445) within 14 days of the exceedance occurring (or other timeframe agreed by DPE). • Implement reasonable remediation measures as directed by DPE, subject to land access. • Notify DAWE of any detection or predictions of an exceedance of a performance measure within two business days. • Submit an Impact Response Plan to DAWE (in accordance with Condition 11 of the DAWE Consent for the Tahmoor South Project).

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	Action	Response
	Pre-mining: • Visual assessment by a heritage consultant. • Pre-mining condition and structural assessment as per the Main Southern Railway Management Plan. • Install monitoring system as per the Subsidence Monitoring Plan. During mining: Regular monitoring as per the Main Southern Railway Management Plan. Post-mining: • Visual inspection by a heritage consultant at the completion of Longwalls LW S7A. • Inspections and assessments as per the Main Southern Railway Management Plan.			
Notes: [1] EIS predictions for historical heritage sites summarised in Section 4.2 of the Heritage Management Plan.				

Table A. 1 Risk Control Procedures for LWs S1A-S7A

GENERAL TRIGGER LEVELS

Trigger Level	Description
GREEN	Observations within operating tolerance. Operate as normal.
BLUE	Observations within operating tolerance but nearing limits. Investigate cause. Some action may be required to prevent operating restrictions. Immediately inspect site unless it is obvious that the cause of the trigger cannot be due to physical damage to rail infrastructure. Otherwise inspect within 24 hours. Return status to Green level.
YELLOW	Restrictions on operations. Immediate site inspection. Action required within 6 hours. Appropriate speed restriction may apply until altered to Green or Blue Level.
RED	Stop trains, inspect prior to next train, repair to lower category, pilot trains if safe.

ABBREVIATIONS WITHIN THESE TABLES:

ARTC = Australian Rail Track Corporation

MSO = NSW Department of Planning & Environment, Resources Regulator, Mine Safety Operations

ONRSR = Office of the National Rail Safety Regulator

Globetech = Automated Monitoring Contractor

SRS = Southern Rail Surveys (ground surveys within rail corridor)

SA NSW = Subsidence Advisory NSW

MSEC = Mine Subsidence Engineering Consultants

RMG = Rail Management Group

RMC = Rail Maintenance Contractor

RRG = Rail Response Group

RSRG = Rail Structures Response Group

PCE = Pidgeon Civil Engineering

JMA = JMA Solutions (structural engineer)

SMEC = SMEC (ground surveys beyond rail corridor)

TC = Tahmoor Coal

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
General Procedures				
	GREEN	**EARLY WARNING MONITORING**		
		Continuous GNSS monitoring for S1 to S15 as shown in Drawing No. MSEC1201-03	GNSS units S1 to S15 installed Continuous readings, with data averaged over 24 hours and recorded once per day until end of LW S7A.	Tahmoor Coal (Unit Zero)
		Continuous GNSS monitoring for S28 at 100.52 km	GNSS unit S28 installed Continuous readings, with data averaged over 24 hours and recorded once per day until end of LW S7A.	Tahmoor Coal (Unit Zero)
		2D survey line along Tahmoor Mine property boundary	Pegs installed and baseline survey completed. Monthly survey during LW S1A between 200m and 1300m extraction, and continue if ongoing adverse movements are observed. End of LW S1A (complete).	Tahmoor Coal (SMEC)
		RAILWAY TRACK		
		3D ground survey along rail corridor *Extents for 3D surveys:* *LW S1A: 99.80km to 98.74km (AP2) and then extend to the north to include pegs that are at least 400 metres in front of the LW face, up to 97.70 km. (End of LW from 97.70 km to 99.80km)* LW S2A: *100.20km to 99.46km (AP4) and then extend to the north to include pegs that are at least 400 metres in front of the LW face, up to 98.18 km. (End of LW from 100.20km to 97.70km)* LW S3A: *100.60km to 99.78km (AP5) and then extend to the north to include pegs that are at least 400 metres in front of the LW face, up to 98.38 km. (End of LW from 100.60km to 98.20km)* LW S4A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 400 metres in front of the LW face, up to 98.74 km. (End of LW from 100.90km to 98.38km)* LW S5A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 400 metres in front of the LW face, up to 99.10 km. (End of LW from 101.16km to 98.92km)* LW S6A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 400 metres in front of the LW face, up to 99.46 km. (End of LW from 101.16km to 99.28km)* LW S7A: *101.16km to 100.14km and then extend to the north to include pegs that are at least 400 metres in front of the LW face, up to 99.46 km. (End of LW from 101.16km to 99.28km)*	Pegs installed for LWs S1A-S7A Monthly 3D surveys commencing as per below (Stage 1): LW S1A: start after 700m extraction LW S2A: start after 550m extraction LW S3A: start after 200m extraction LW S4A: at LW start LW S5A: at LW start LW S6A: at LW start LW S7A: at LW start End of LWs S1A-S7A.	SRS
		Focussed 2D ground survey along rail corridor *Extents for focussed 2D surveys:* *LW S1A: 99.80km to 98.74km (AP2) and then extend to the north to include pegs that are at least 200 metres in front of the LW face, up to 97.70 km. (End of LW from 97.70 km to 99.80km)* LW S2A: *100.20km to 99.46km (AP4) and then extend to the north to include pegs that are at least 200 metres in front of the LW face, up to 98.18 km. (End of LW from 100.20km to 97.70km)* LW S3A: *100.60km to 99.78km (AP5) and then extend to the north to include pegs that are at least 200 metres in front of the LW face, up to 98.38 km. (End of LW from 100.60km to 98.20km)* LW S4A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 200 metres in front of the LW face, up to 98.74 km. (End of LW from 100.90km to 98.38km)* LW S5A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 200 metres in front of the LW face, up to 99.10 km. (End of LW from 101.16km to 98.92km)* LW S6A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 200 metres in front of the LW face, up to 99.46 km. (End of LW from 101.16km to 99.28km)* LW S7A: *101.16km to 100.14km and then extend to the north to include pegs that are at least 400 metres in front of the LW face, up to 99.46 km. (End of LW from 101.16km to 99.28km)*	Pegs installed for LW S1A-S7A Weekly 2D surveys commencing as per below (Stage 2): LW S1A: start after 900m extraction LW S2A: start after 750m extraction LW S3A: start after 400m extraction LW S4A-S7A: start after GNSS 28 at 100.52km subsides more than 20mm after LW start or 200m extraction, whichever occurs first End of LWs S1A-S7A.	SRS
		Rail creep surveys of expansion switches, anchor points and CWR track (include all track expansion system zones where ZTL clips have been installed)	Weekly after ZTL clips have been installed	SRS
		Long bay length ground surveys *Extents for long bay length ground surveys as per focussed 2D surveys*	Weekly as per focussed 2D surveys (Stage 2)	SRS
		Continuously monitor rail stress, rail temperature and switch displacement *Extents for active subsidence monitoring:* *LW S1A: 99.78km to 98.74km (AP2) and then extend to the north to include gauges that are at least 200 metres in front of the LW face, up to 97.78 km.* LW S2A: *100.14km to 99.46km (AP4) and then extend to the north to include gauges that are at least 200 metres in front of the LW face, up to 98.14 km.* LW S3A: *100.44km to 99.78km (AP5) and then extend to the north to include gauges that are at least 200 metres in front of the LW face, up to 98.38 km.* LW S4A: *101.10km to 100.14km (AP6) and then extend to the north to include gauges that are at least 200 metres in front of the LW face, up to 98.74 km.* LW S5A: *101.10km to 100.14km (AP6) and then extend to the north to include gauges that are at least 200 metres in front of the LW face, up to 99.10 km.* LW S6A: *101.10km to 100.14km (AP6) and then extend to the north to include gauges that are at least 200 metres in front of the LW face, up to 99.46 km.* LW S7A: *101.10km to 100.14km (AP6) and then extend to the north to include gauges that are at least 200 metres in front of the LW face, up to 99.46 km.*	Gauges installed for LWs S1A to S7A Readings every 5 minutes Alarmed as per below (Stage 2) LW S1A: start after 900m extraction LW S2A: start after 750m extraction LW S3A: start after 400m extraction LW S4A: at LW start LW S5A: at LW start LW S6A: at LW start LW S7A: at LW start	Globetech

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
		Continuously monitor rail stress and rail temperature to monitor residual subsidence effects *Residual subsidence monitoring = at least one working gauge every 120 m along each rail (extent may be reduced from the north based on future assessment)*	Every 5 minutes	Globetech
		Track geometry surveys using Amber track mounted device or equivalent *Extents for track geometry surveys as per focussed 2D surveys*	Weekly as per focussed 2D surveys (Stage 2)	RMC
		Track centre measurements at 98.620 km, 99.600 km and 101.200 km	Monthly when track is in Stage 2	SRS
		Track inspection by qualified track certifier. The inspection will check ARTC infrastructure within the rail corridor, including the track, track expansion system, integrity of monitoring systems, culverts, embankments, cuttings, signals and Loc's and fences *The extent of visual inspections is the same as the extent of track geometry surveys plus dormant expansion switches*	Twice weekly whilst expansion switches are in track Daily as per below (Stage 2) LW S1A: start after 900m extraction LW S2A: start after 750m extraction LW S3A: start after 300m extraction LW S4A-S7A: start after GNSS 28 at 100.52km subsides more than 20mm after LW start or 200m extraction, whichever occurs first	RMC
		RAILWAY CULVERTS AND EMBANKMENTS		
		Absolute 3D and 2D surveys along monitoring line along the railway	Absolute 3D monthly and 2D weekly as described for railway track	SRS
		Absolute 3D surveys and relative 3D surveys along monitoring lines on the crests and/or toes of the embankments on both sides and at culvert inlets and outlets. The layout of survey marks are shown in Drawings Nos. MSEC1201-05 to 12. *Install Culvert and Embankment at 98.445 km prior to 600 metres of extraction of LW S1A* *Install Culvert and Embankment at 98.739 km prior to 600 metres of extraction of LW S1A* *Install Culvert and Embankment at 99.035 km prior to 600 metres of extraction of LW S1A* *Install Culvert and Embankment at 99.338 km prior to 600 metres of extraction of LW S1A* *Install Culvert and Embankment at 100.121 km prior to start of LW S3A* *Install Culvert and Embankment at 100.425 km prior to start of LW S3A* *Install Culvert and Embankment at 101.000 km prior to start of LW S5A*	Monthly when track above each culvert is in Stage 1 Weekly when track above each culvert is in Stage 2 End of LW S1A-S7A	SRS
		Automated, continuously operating horizontal extensometers (or equivalent) across the crests of the Embankments at 99.338 km, 100.121 km and 100.425 km *Install 99.338 km prior to 900 metres of extraction of LW S1A* *Install 100.121 km prior to start of LW S3A* *Install 100.425 km prior to start of LW S3A*	Every 15 minutes Operating as per timings in Drawings Nos. MSEC1201-04-1A to 7A. Alarmed when track above each culvert is in Stage 2	Globetech
		Inclinometer surveys of the Embankments at 99.338 km, 100.121 km and 100.425 km *Install 99.338 km prior to 600 metres of extraction of LW S1A* *Install 100.121 km prior to start of LW S3A* *Install 100.425 km prior to start of LW S3A*	Monthly when track above culvert is in Stage 1 and Stage 2	TC
		Automated, continuously operating water level sensors at culvert inlets to Embankments at 99.338 km, 100.121 km and 100.425 km *Install 99.338 km prior to 600 metres of extraction of LW S1A* *Install 100.121 km prior to start of LW S3A* *Install 100.425 km prior to start of LW S3A*	Every 15 minutes Operating as per timings in Drawings Nos. MSEC1201-04-1A to 7A. Alarmed when track above culvert is in Stage 2	Globetech
		Visual inspection of culverts and embankments by geotechnical engineer	Monthly when track above culvert is in Stage 1 Weekly when track above culvert is in Stage 2	PSM
		CUTTINGS		
		Absolute 3D and 2D surveys along monitoring line along the railway	Absolute 3D monthly and 2D weekly as described for railway track	SRS
		Absolute 3D surveys every 20 metres along the crests and/or toes of the cuttings *Install Cutting at 99.690 km prior to 450 metres of extraction of LW S2A* *Install Cutting at 100.700 km prior to start of LW S4A* *Install Cutting at 101.162 km prior to start of LW S5A*	Monthly when section of track is in Stage 1 Weekly when section of track is in Stage 2 End of LWs S1A-S7A	SRS
		Visual inspection of cuttings by geotechnical engineer	Monthly when section of track is in Stage 1 Weekly when section of track is in Stage 2	PSM

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
	GREEN	**BRIDGES**		
		Pre-mining inspection and structural assessment of Bridges	Complete	JMA
		Geological inspection and mapping at Railway Viaduct, Remembrance Drive Bridge over Bargo River and Bargo River Road Overbridge (Potter's Cutting)	Complete	Newcastle Geotech
		Review by Bridge Technical Committee and modify planned management and monitoring measures for Railway Viaduct, Remembrance Drive Bridge over Bargo River, Bargo River Road Overbridge (Potter's Cutting) and Wellers Road Overbridge and implement, if required	Complete	Bridge Technical Committee / Tahmoor Coal
		Brief ARTC on planned management and monitoring measures for Railway Viaduct, Remembrance Drive Bridge over Bargo River, Bargo River Road Overbridge (Potter's Cutting) and Wellers Road Overbridge	Complete	Tahmoor Coal
		Continuous GNSS monitoring for S11, S12 (Railway Viaduct) and S15 (Wellers Road Overbridge) as shown in Drawing No. MSEC1201-03	GNSS units installed Continuous readings, with data averaged over 24 hours and recorded once per day until end of LW S7A.	Tahmoor Coal (Unit Zero)
		Conduct Absolute 3D survey of structure and ground marks on the Railway Viaduct and Remembrance Drive Bridge over Bargo River as per Drawing No. MSEC1201-13	Complete	Tahmoor Coal (SRS)
		Precision 2D survey of closure between ground marks located in stable ground at both ends of the Railway Viaduct and Remembrance Drive Bridge over Bargo River	Complete	SRS
		Baseline detailed visual inspections of Railway Viaduct by UAV	Complete	TC
		Baseline laser scan of Railway Viaduct and Remembrance Drive Bridge over Bargo River	Complete	TC
		Monitoring of existing cracks with crack gauges on Railway Viaduct	Complete	TC
		Measure gap between deck and northern abutment of Remembrance Drive Bridge over Bargo River	Complete	Tahmoor Coal (SRS)
		Conduct Local 3D survey of structure and ground marks on the Bargo River Road Overbridge (Potter's Cutting) as per Drawing No. MSEC1201-14, with one mark on the Bridge to be surveyed in Absolute 3D	Complete	Tahmoor Coal (SRS)
		Monitoring of existing cracks with crack gauges on Bargo River Road Overbridge (Potter's Cutting)	Complete	TC
		Conduct Local 3D survey of structure and ground marks on the Wellers Road Overbridge as per Drawing No. MSEC1201-15	Baseline survey complete. Monthly after 200m extraction of LWs S4A to S7A End of LWs S1A to S7A.	Tahmoor Coal (SRS)
		Automated, continuous monitoring of laser distancemeters and draw wire displacement sensors along and across the Overbridge at base of arch	Installed and operating Readings every 15 minutes	Tahmoor Coal (Sweeting Consulting)
		Monitoring of existing cracks with crack gauges on Wellers Road Overbridge	Install and baseline survey prior to LW S4A. Monthly after 200m extraction of LWs S4A to S7A End of LWs S1A to S7A.	TC

Table A. 1 Risk Control Procedures for LWs S1A-S7A (continued)

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
General Procedures (continued)				
	GREEN	**COAL CONVEYOR CROSSING (complete)**		
		Survey horizontal distance between conveyor trestles on either side of Railway	Complete	SRS
		Automated, continuously operating laser distancemeter between conveyor trestles on either side of Railway	Installed Hourly	SweetingConsulting
		Visual inspections of conveyor crossing	Daily when track is in Stage 2	RMC
		OTHER MEASURES		
		Undertake investigations as required to assist in identifying potential locations of non-conventional movement. Reconsider management measures in light of new information that becomes available.	Ongoing	RMG
		Dilapidation inspections	Complete	Various
		Standard ARTC maintenance and control procedures - Twice weekly track patrol - AK track recording car - Base Operating Standards Mandatory Responses - Driver reports and temporary speedboards - Signalling and Communications procedures - Ultrasonic rail test (high rail)	As per ARTC procedures	ARTC
		Follow Railway Maintenance Plan including - quarterly manual non-destructive testing of expansion switches - switch inspections and maintenance - clip inspections and maintenance Refer Section 5.8 for details	As per Railway Maintenance Plan	RMC
		Brief and train: - Tahmoor Coal Control Room operators - Relevant ARTC staff Refer Section 5.8 for details	Prior to 900 m of extraction of LW S1A Brief and train new personnel as req'd	Robinson Rail
		Check and Audit maintenance and monitoring system performance	Periodically as determined by RMG	RMG
		Analyse and report results to RMG	Monthly when section of track is in Stage 1 Weekly when section of track is in Stage 2	Section 6.5
		RMG discuss results and consider whether any additional management measures are required	Monthly when section of track is in Stage 1 Weekly when section of track is in Stage 2 or as required by RMG	RMG
		RMG discuss progress with MSO and ONRSR	As required	RMG

Note: Unless specified above, each control procedure will continue until such time that the criteria for Stage 3 (post-active subsidence period) are met, as described in Section 5.4: The RMG may extend the monitoring period beyond the timing and frequency described based on assessment of actual monitoring data.

Table A. 1 Risk Control Procedures for LWs S1A-S7A (continued)

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
Track Geometry exceeds ARTC National Code of Practice, leading to: • Unplanned maintenance response • Temporary speed restrictions • Track closure • Derailment **TRACK GEOMETRY TRIGGERS** **Units in mm** / **Difference from Design Cant** / **Twist** / **Top Mid-ordinate Vertical Deviation from Design Offset** / **Alignment Mid-ordinate Horizontal Deviation from Design Offset in a 10m Chord** **GREEN**: Tangents & R>2000m 0 to < 40; R < 2000m 0 to < 14 / 2m Chord 0 to < 16; 14m Chord 0 to < 40 / 6m Chord 0 to < 26; 20m Chord Inertial 0 to < 28; Krab 0 to < 39 / 0 to < 24 **BLUE**: Tangents & R>2000m ≥ 40 to < 50; R < 2000m (insufficient cant) ≥ 14 to < 20; R < 2000m (excess cant) ≥ 14 to < 50 / 2m Chord ≥ 16 to < 18; 14m Chord ≥ 40 to < 46 / 6m Chord ≥ 26 to < 29; 20m Chord Inertial ≥ 28 to < 32; Krab ≥ 39 to < 44 / ≥ 24 to < 34 **YELLOW**: Tangents & R>2000m ≥ 50 to < 75; R < 2000m (insufficient cant) ≥ 20 to < 40; R < 2000m (excess cant) ≥ 50 to < 75 / 2m Chord ≥ 18 to < 20; 14m Chord ≥ 46 to < 52 / 6m Chord ≥ 29 to < 32; 20m Chord Inertial ≥ 32 to < 35; Krab ≥ 44 to < 49 / ≥ 34 to < 44 **RED**: Tangents & R>2000m ≥ 75; R < 2000m (insufficient cant) ≥ 40; R < 2000m (excess cant) ≥ 75 / 2m Chord ≥ 20; 14m Chord ≥ 52 / 6m Chord ≥ 32; 20m Chord Inertial ≥ 35; Krab ≥ 49 / ≥ 44	**GREEN**	Follow general procedures (including track geometry monitoring)	-	-
	BLUE	Contact RRG and arrange teleconference	Within 15 minutes of determining exceedence of trigger level	Section 6.2 and Section 6.3
		RRG undertake following action(s): - investigate cause - assess monitoring data for trends and forecast if and/or when the YELLOW and RED trigger levels might be exceeded - consider whether to increase survey and/or inspection frequencies - consider whether to resurface the track - consider whether any other additional management measures are req'd	RRG meet via teleconference within 15 minutes of notification of exceedence of trigger level	RRG
		Inspect track at trigger point for visual signs of impact unless RRG is confident that cause of trigger cannot be due to physical damage to the railway Remain on site until status returns to GREEN level	Immediately following assessment of RRG via teleconference and arrive within 2 hours, if req'd Otherwise within 24 hours	RMC
		Report details of exceedence of trigger level and actions undertaken	Within one week	PCE
	YELLOW	Contact RRG and arrange teleconference	Within 15 minutes of determining exceedence of trigger level	Section 6.2 and Section 6.3
		Contact Train Control & introduce track speed of 20km/h. Inspect track at trigger point.	Immediately	RMC
		RRG undertake following action(s): - investigate cause and assess monitoring data for trends and forecast if and/or when the RED trigger level might be exceeded - decide whether to increase survey and/or inspection frequencies - decide whether to resurface the track - decide whether any other additional management measures are req'd - decide whether to introduce speed restrictions - consider whether to slow or stop mining if impact to rail operations is unacceptable to ARTC	RRG meet via teleconference within 15 minutes of notification of exceedence of trigger level	RRG
		Report exceedence of trigger level & RRG decisions to RMG, ARTC, MSO, ONRSR and SA NSW	Within 24 hours if the alarm is real	TC
		Report details of exceedence of trigger level and actions undertaken	Within one week	PCE
	RED	Contact RRG and arrange teleconference	Within 15 minutes of determining exceedence of trigger level	Section 6.2 and Section 6.3
		Stop trains and implement mandatory responses as required. Inspect track at trigger point.	Immediately	RMC
		RRG undertake following action(s): - investigate cause - decide whether to resurface the track - decide whether any other additional management measures are req'd - decide whether to introduce speed restrictions - consider whether to recommend to TC senior management to slow or stop mining if impact to rail operations is unacceptable to ARTC	RRG meet via teleconference within 15 minutes of notification of exceedence of trigger level	RRG
		Report exceedence of trigger level & RRG decisions to RMG, ARTC, MSO, ONRSR and SA NSW.	Within 24 hours if the alarm is real	TC
		Report details of exceedence of trigger level and actions undertaken	Within one week	PCE

Table A. 1 Risk Control Procedures for LWs S1A-S7A (continued)

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
Mining induced ground movements causes excessive compressive stress resulting in either misalignment of track, broken rail or curve pull-in potentially leading to: • Unplanned maintenance response • Temporary speed restrictions • Track closure • Side swipe • Derailment This risk issue applies to standard CWR track or track with expansion switches and zero toe load clips or **Zero-toe load clips jam** resulting in increase in rail stress potentially leading to: • Unplanned intervention on track ‘	GREEN	Follow general procedures (including rail stress, rail creep and switch displacement monitoring)	-	-
		Install, operate and monitor track expansion system (Note that CWR track will be managed until the track expansion system is installed).	Switches ES4 to ES7 installed for LW S4A. Install ES8 as required in Table 3.3. Install ZTL clips prior to longwall face approaching within 400 m of each switch after monitoring system is commissioned	RMC
	BLUE	Automatically notify RRG as per Alarm Notification Protocol	Within 15 minutes	Section 6.2
		Immediately inspect track at trigger point for visual signs of impact if on site at time of alarm	Within 15 minutes	RMC
		RRG undertake following action(s): - investigate cause - assess monitoring data for trends and forecast if and/or when the YELLOW and RED trigger levels might be exceeded - consider whether to increase survey and/or inspection frequencies - consider whether to adjust the track or expansion switches - consider whether any other additional management measures are req’d	RRG meet via teleconference within 15 minutes of alarm notification	RRG
		Inspect track at trigger point for visual signs of impact unless RRG is confident that cause of trigger cannot be due to physical damage to the railway Remain on site until status returns to GREEN level	Immediately following assessment of RRG via teleconference and arrive within 2 hours, if req’d Otherwise within 24 hours	RMC
		Report details of alarm and actions undertaken	Within one week	PCE
	YELLOW	Automatically notify RRG as per Alarm Notification Protocol	Within 15 minutes	Section 6.2
		Contact Train Control & introduce track speed of 20km/h. Inspect track at trigger point.	Immediately	RMC
		RRG undertake following action(s): - contact Train Control & introduce track speed of 20km/h if Track Certifier is not on site unless RRG is confident the cause of trigger cannot be due to physical damage to the railway within 5 minutes of alarm notification - investigate cause and assess monitoring data for trends and forecast if and/or when the RED trigger level might be exceeded - decide whether to increase survey and/or inspection frequencies - decide whether to adjust the track or expansion switches - decide whether any other additional management measures are req’d - decide whether to introduce speed restrictions - consider whether to slow or stop mining if impact to rail operations is unacceptable to ARTC	RRG meet via teleconference within 15 minutes of alarm notification	RRG
		Report exceedence of trigger level & RRG decisions to RMG, ARTC, MSO, ONRSR and SA NSW	Within 24 hours if the alarm is real	TC
		Report details of alarm and actions undertaken	Within one week	PCE
	RED	Automatically notify RRG as per Alarm Notification Protocol	Within 15 minutes	Section 6.2
		Stop trains and implement mandatory responses as required unless RRG is confident the cause of trigger cannot be due to physical damage to the railway within 5 minutes of alarm notification. Inspect track at trigger point.	Immediately	RMC
		RRG undertake following action(s): - investigate cause - advise ARTC Area Manager Ingleburn that trains can proceed under caution at 20km/h prior to Track Certifier arriving on site if confident that cause of trigger cannot be due to physical damage to the railway - decide whether to adjust the track or expansion switches - decide whether any other additional management measures are req’d - decide whether to introduce speed restrictions - consider whether to recommend to TC senior management to slow or stop mining if impact to rail operations is unacceptable to ARTC	RRG meet via teleconference within 15 minutes of alarm notification	RRG
		Report exceedence of trigger level & RRG decisions to RMG, ARTC, MSO, ONRSR and SA NSW	Within 24 hours if the alarm is real	TC
		Report details of alarm and actions undertaken	Within one week	PCE

RAIL STRESS TRIGGERS

	Tension		Compression	
	Rail Stress in CWR	Rail Stress in Free Rail	Rail Stress in CWR	Rail Stress in Free Rail
Units	MPa	MPa	MPa	MPa
GREEN	0 to <114.2	0 to < 46.4	0 to > -83.3	0 to > -46.4
BLUE	≥ 114.2 to < 123.8	≥ 46.4 to < 123.8	≤ -83.3 to > -92.8	≤ -46.4 to > -92.8
YELLOW	≥ 123.8 to < 128.5	≥ 123.8 to < 128.5	≤ -92.8 to > -97.6	≤ -92.8 to > -97.6
RED	≥ 128.5	≥ 128.5	≤ -97.6	≤ -97.6

Note: Blue trigger levels transition between CWR and Free Rail sections, as recommended by the RMG.

Table A. 1 Risk Control Procedures for LWs S1A-S7A (continued)

<table>
<tr><th>RISK ISSUE</th><th>TRIGGER</th><th>CONTROL PROCEDURES</th><th>TIMING & FREQ</th><th>BY WHOM?</th></tr>
<tr><td rowspan="5">Switch fails potentially leading to:
Unplanned maintenance response
Speed restrictions
Track closure
Derailment
or
Switch exceeds operational limits due to excessive differential subsidence movements potentially leading to:
Intervention on track
Speed restrictions
TYPE 5 EXPANSION SWITCH DISPLACEMENT TRIGGERS
(TYPE APPROVAL 15/34296)<table><tr><th></th><th>Switch Opening</th><th>Switch Closure</th></tr><tr><th>Units</th><th>mm</th><th>mm</th></tr><tr><td>GREEN</td><td colspan="2">Centre ± 135</td></tr><tr><td>BLUE</td><td>Centre ≤ -135</td><td>Centre ≥ 135</td></tr><tr><td>YELLOW</td><td>N/A due to stop blocks</td><td>N/A due to stop blocks</td></tr><tr><td>RED</td><td>N/A due to stop blocks</td><td>N/A due to stop blocks</td></tr></table>Note: Expansion switch triggers apply to each switch blade and are measured from edge of base plate.</td><td>GREEN</td><td>Follow general procedures (including rail stress, rail creep and switch displacement monitoring, maintenance plan)</td><td>-</td><td>-</td></tr>
<tr><td rowspan="4">BLUE</td><td>Automatically notify RRG as per Alarm Notification Protocol</td><td>Within 15 minutes</td><td>Section 6.2</td></tr>
<tr><td>Immediately inspect track at trigger point for visual signs of impact if on site at time of alarm</td><td>Within 15 minutes</td><td>RMC</td></tr>
<tr><td>RRG undertake following action(s):
- investigate cause
- assess monitoring data for trends and forecast if and/or when the YELLOW and RED trigger levels might be exceeded
- consider whether to increase survey and/or inspection frequencies
- consider whether to adjust the track or expansion switches
- consider whether any other additional management measures are req’d</td><td>RRG meet via teleconference within 15 minutes of alarm notification</td><td>RRG</td></tr>
<tr><td>Inspect track at trigger point for visual signs of impact unless RRG is confident that cause of trigger cannot be due to physical damage to the railway
Remain on site until status returns to GREEN level</td><td>Immediately following assessment of RRG via teleconference and arrive within 2 hours, if req’d
Otherwise within 24 hours</td><td>RMC</td></tr>
<tr><td>Report details of alarm and actions undertaken</td><td>Within one week</td><td>PCE</td></tr>
<tr><td rowspan="2">Braking / acceleration loads resulting in rail creep that potentially leads to intervention on track (limits function of expansion switch)</td><td rowspan="2">GREEN</td><td>Follow general procedures (including rail stress, rail creep and switch displacement monitoring)</td><td>-</td><td>-</td></tr>
<tr><td>Install anchor points as per design</td><td>-</td><td>RMC</td></tr>
<tr><td>Switch allows excessive opening of a broken rail underneath rail traffic potentially leading to derailment</td><td>GREEN</td><td>Follow general procedures (including quarterly non-destructive testing of welds, maintenance plan). Note that rails are in zero-toe load track, which has effectively unstressed the rail and should not break.
Blue, Yellow and Red triggers and responses under “Switch Failure” also apply to this risk.</td><td>-</td><td>-</td></tr>
<tr><td>Switch becomes unserviceable due to uneven wear, inherent design or quality of steel</td><td>GREEN</td><td>Follow general procedures (including maintenance plan).</td><td>-</td><td>-</td></tr>
<tr><td rowspan="4">Switch or switches destroyed due to unrelated derailment, such that switches are removed and replaced by straight rail, potentially leading to train delays due to undertaking frequent adjustments of CWR track in response to continued mine subsidence movements</td><td rowspan="2">GREEN</td><td>Follow general procedures, including standard ARTC wayside detection, redundant monitoring controls (ground survey, track inspections, amber track geometry and automated monitoring systems) and on call maintenance.</td><td>-</td><td>-</td></tr>
<tr><td>Store critical spare parts on site</td><td>Prior to subsidence</td><td>RMC</td></tr>
<tr><td rowspan="2">Switch or switches destroyed by unrelated derailment</td><td>Notify RMG in accordance with Alarm Notification Protocol</td><td>Immediately</td><td>RMC</td></tr>
<tr><td>RMG meet and consider in consultation with ARTC Incident Management Team, MSO and ONRSR the implementation of additional control measures. These may include:
- repair switches and replace with spare parts as required
- introduce speed restrictions once track is re-opened by ARTC
- consolidate all remaining operational switches to one track and conduct single line working
- spread out all remaining operational switches on both tracks and reassess with smaller trigger levels for switch displacement due to longer free rail lengths
- increase monitoring frequency
- regular cut and re-stress of CWR track based on ground monitoring data
- consider need to stop or slow longwall progress until switches are operational</td><td>Within 24 hours</td><td>RMG</td></tr>
<tr><td rowspan="3">Damage to track circuits, from installation of expansion switches potentially leading to:
Signal failure leading to train delays</td><td>GREEN</td><td>Install appropriate bonding</td><td>During installation of expansion switches</td><td>RMC</td></tr>
<tr><td rowspan="2">Bonding damaged</td><td>Repair bonding</td><td>As required</td><td>RMC</td></tr>
<tr><td>Report impact and actions taken to RMG, ARTC, MSO & ONRSR</td><td>Within one week</td><td>RMC</td></tr>
<tr><td rowspan="3">Damage to signals, potentially leading to:
Signal failure leading to train delays</td><td>GREEN</td><td>Follow general procedures (including visual inspections within rail corridor)</td><td></td><td></td></tr>
<tr><td rowspan="2">Signals damaged</td><td>Repair signals</td><td>As required</td><td>RMC</td></tr>
<tr><td>Report impact and actions taken to RMG, MSO, ONRSR & SA NSW</td><td>Within one week</td><td>TC</td></tr>
</table>

Table A. 1 Risk Control Procedures for LWs S1A-S7A (continued)

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
Reduction in track centres at 98.620 km, 99.600 km and 101.200 km, where centre are currently tight	**GREEN**	Follow general procedures (including ground surveys, track centre surveys at 98.620 km, 99.600 km and 101.200 km and visual inspections within rail corridor)	-	-
	Reduction in track centres > 5 mm or Change in Cant in either track > 5 mm	RMG meet and consider whether any additional management measures are required, including: - detailed measurement of track centres - locally redesign track alignment - resurface track in accordance with redesign	As required	RMG
		Report details of RMG decision and actions undertaken	Within one week	Globetech
Loss of track geometry due to **localised ponding, or** **Loss in drainage grade** of culverts due to mining-induced tilts, potentially leading to: • Unplanned maintenance response	**GREEN**	Follow general procedures (including visual inspections within rail corridor)	-	-
	Ponding observed	Regrade drainage line	As required	RMC
		Report impact and actions taken to RMG	Within one week	RMC
Damage to Formation due to mining-induced surface cracks forming a bog hole in formation causing a loss of track geometry, potentially leading to: • Unplanned maintenance response	**GREEN**	Follow general procedures (including visual inspections within rail corridor)	-	-
	Surface crack observed	Repair crack or regrade drainage line or repair sewer pipes	As required	RMC
		Report impact and actions taken to RMG	Within one week	RMC
False alarms from automated monitoring systems potentially leading to: • Unnecessary speed restrictions	**GREEN**	Follow general procedures (including multiple redundancies in monitoring system)	-	-
		Develop maintenance, testing and audit program for automated monitoring systems	Prior to subsidence	Globetech/ PCE-
		Develop alarm programming methods to filter obvious false alarms (refer Section 5.5.5). Reduce number of gauges with alarms enabled, where possible in accordance with the Management Plan.	Prior to subsidence	Globetech / RMG
	Excessive false alarms occur	RMG meet and consider whether any additional management measures are required, including: - reduce incidence of false alarms - replace or adjust gauge or cable - increase monitoring and reporting procedures	As required	RMG
		Report details of RMG decision and actions undertaken	Within one week	Globetech
Loss of all or part of automated monitoring system due to power surge, lightning strike, vandalism, power/comms failure, trackwork	**GREEN**	Follow general procedures (including multiple redundancies in monitoring system)	-	-
		Install back-up systems for power (battery), dual SIM, internet link to Tahmoor Coal Control Centre	Prior to subsidence	Globetech
		Program alarm alerts at off-site computer	Prior to subsidence	Globetech
		Store spare parts on site (gauges, loggers, batteries, router)	Prior to subsidence	Globetech
	GREY	Notify RRG in accordance with Alarm Notification Protocol	Within 15 minutes	Section 6.2
		Inspect track at trigger point if on site at time of alarm	Within 15 minutes	RMC
		RRG meet and consider whether any additional management measures are required, including: - investigate cause - install replacement battery - install secondary wireless network card - replace damaged components - increase monitoring and reporting procedures	RRG meet via teleconference within 15 minutes of alarm notification	RRG
		Inspect track at trigger point for visual signs of impact unless RRG is confident that cause of trigger cannot be due to physical damage to the railway Remain on site until status returns to GREEN level or until approved by RRG	Immediately following assessment of RRG via teleconference and arrive within 2 hours, if req'd Otherwise within 24 hours	RMC
		Report details of alarm and actions undertaken	Within one week	Globetech
False readings due to installation problem, failed gauge, software failure, programming error	**GREEN**	Follow general procedures (including multiple redundancies in monitoring system, regular analysis cross checking and reporting)	-	-
	False readings are found	Repair cause of false reading	As required	Globetech
		Report details of RMG decision and actions undertaken	Within one week	Globetech

Table A. 1 Risk Control Procedures for LWs S1A-S7A (continued)

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
Damage to cutting face potentially leading to: • Blockage of drainage line	**GREEN**	Follow general procedures (including dilapidation survey, visual inspections of cutting, and ground surveys)	-	-
		Clear debris from cesses at base of batter slopes	As required	RMC
	Instability observed to cuttings	Notify RMG in accordance with Alarm Notification Protocol	As required by Track Certifier depending on severity of impact	RMC
		RMG meet and consider whether any additional management measures are required, which may include: - undertake geotechnical inspection - increase monitoring and reporting procedures - clear debris from cess at base of cutting faces	RMG meet via teleconference as required by Track Certifier depending on severity of impact	RMG
		Report impact and actions taken to ARTC, MSO & ONRSR	Within one week	TC
	Cutting closure exceeds 20 mm	Notify RMG in accordance with Alarm Notification Protocol	Within one week	RMC
		RMG meet and consider whether any additional management measures are required, which may include: - undertake geotechnical inspection - increase monitoring and inspections for potential impacts on track geometry and - increase reporting procedures	RMG meet via teleconference within one week	RMG
		Report trigger exceedence and actions taken to ARTC, MSO & ONRSR	Within one week	TC
Damage to optical fibre cable, potentially leading to: • Loss of security monitoring • Lack of train information service • Lack of other commercial use	**GREEN**	Follow general procedures (including visual inspections within rail corridor)	-	-
	Ground strain exceeds 3 mm/m (tensile or compressive	Notify RMG	As required by RMC depending on severity of impact	RMC
		RMG meet and consider whether any additional management measures are required, which may include: - undertake inspection by signalling expert - increase monitoring and reporting procedures - consider undertaking additional tests on optical fibre cable - consider exposure of cable and provide freedom of cable movement in vicinity of ground deformation	As required	RMG
		Report impact and RMG decisions to ARTC, MSO, ONRSR & SA NSW	Within one week	TC
	Cable damage	Repair cable	As required	RMC
		Report impact and actions taken to RMG, ARTC, MSO, ONRSR & SA NSW	Within one week	TC
Breakage of buried copper cable, potentially leading to: • Signal failure leading to train delays • Wrong Side Failure	**GREEN**	Follow general procedures (including dilapidation survey, visual inspections, ground survey, standard ARTC 'failsafe' signalling system, automated monitoring of signal)	-	-
		Inspect condition of cable	Prior to 900m of extraction of LW S1A	TC
		Conduct electrical tests on spare cores	Prior to 900m of extraction of LW S1A End of LWs S1A-S7A	TC
	Ground strain exceeds 3 mm/m (tensile or compressive)	Notify RMG	As required by RMC depending on severity of impact	RMC
		RMG meet and consider whether any additional management measures are required, which may include: - undertake inspection by signalling expert - increase monitoring and reporting procedures - consider undertaking additional electrical tests on signal cable - consider exposure of cable to provide freedom of cable movement in vicinity of ground deformation	As required	RMG
		Report impact and actions taken to RMG, ARTC, MSO, ONRSR & SA NSW	Within one week	MSEC
	Cable damage	Repair cable	As required	RMC
		Report impact and actions taken to RMG, ARTC, MSO, ONRSR & SA NSW	Within one week	MSEC

Table A. 1 Risk Control Procedures for LWs S1A-S7A (continued)

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
Damage to culverts or culvert floor potentially leading to: • Changes in track geometry resulting from loss of support, leading to intervention • Development of sinkhole and undermining track • Loss of culvert integrity, leading to intervention • Cracking and deformation	**GREEN**	Follow general procedures (including dilapidation survey, ground survey, visual inspections of culverts, track geometry monitoring)	-	-
		De-vegetation of the embankment batters and maintain culverts to keep them free flowing	Before track above each culvert is in Stage 1	TC
		Install above track baulks above culverts	Before track above each culvert is in Stage 2	TC
		Seal gap between the brick arch culvert headwall and concrete pipe extension on the Down side of Culvert at 99.035 km and repair sinkhole	Complete	TC
		Reinstate concrete outlet pipe to Culvert at 99.338 km	Complete	TC
		Seal gap between the brick arch culvert headwall and concrete pipe extension on the Down side of Culvert at 100.121 km	Prior to 200m of extraction of LW S4A	TC
	Damage to culvert such as cracking or gaps found at culvert joints or evidence of piping	Notify RMG and ARTC Structures Specialist	As required by RMC depending on severity of impact	RMC
		RMG meet and consider whether any additional management measures are required, which may include: - undertake structural inspection - increase monitoring and reporting procedures - repair culvert or provide additional support to culvert - strengthen track baulk	As required	RMG
		Report impact and RMG decisions to ARTC, MSO, ONRSR and SA NSW	Within one week	TC
		Report details of impact and actions undertaken	Within one week	MSEC
Embankments • Embankment slope failure or collapse of embankment caused by water saturation of fill due to blockage of culvert leading to build up of water, surcharge from impounded water and saturation of fill due to prolonged rainfall. • Displacement / failure of embankment leading to loss of track support. • Surface cracking of crest and embankment batters due to mining-induced vertical or horizontal ground movements, leading to erosion of batters and long-term embankment instability. • Cracking within embankment due to mining-induced vertical or horizontal ground movements and build up of water within embankment, flowing through cracks, leading to piping failure and formation of sink holes under the track • Cracking of culvert causing loss of fill due to pot holing (vertical) due to mining-induced ground movements, particularly valley closure, leading to development of sinkhole and undermining track **Note:** Refer to other sections of the Risk Control Procedures for managing risks associated with changes in track geometry or changes to culverts	**GREEN**	Follow general procedures (including ground surveys, visual inspections, and for Embankments at 99.338 km, 100.121 km and 100.425 km: extensometers, manual inclinometers and culvert water level gauges).	-	-
		Clear vegetation on the embankment batter and maintain culverts to keep them clear of debris to facilitate monitoring of the embankments and culverts.	Before track above each culvert is in Stage 1	-
	LEVEL 1 **Rate of change in crest extensometer distance exceeds 10 mm within 2 hours** **or** **Crest extensometer or ground surveys across crest measure extension of 25 mm** **or** **Visual signs of distress to embankment, such as tension crack along edge of embankment / access road**	For alarms from extensometer: Inspect embankment at trigger point for visual signs of impact.	Immediate callout and arrive as soon as reasonably practicable (target less than 2 hours)	RMC
		If tension crack observed along edge of embankment, Track Certifier to remain on site until such time that RMG agree that continuous 24 hour / 7 days a week presence by Track Certifier is not required.	Immediately following identification of tension crack	RMC
		Undertake additional geotechnical inspection and appraisal	Within 24 hours	PSM
		RSRG meet and review latest monitoring information from automated and manually acquired data for the embankment, culvert and the track, inspections by geotechnical engineer and Track Certifier, and latest weather forecasts. RSRG consider whether any additional management measures are required, which may include: - fill and seal cracks and/or regrade drainage line - increase monitoring and reporting procedures - arrange additional surveys to monitor potential displacement of embankment material	Within 15 minutes	RSRG
		Report trigger exceedance and actions taken to RMG, ARTC, MSO & ONRSR in Railway Status Report	Within 24 hours if tension crack observed Otherwise within one week	TC

Table A. 1 Risk Control Procedures for LWs S1A-S7A (continued)

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
Embankments • Embankment slope failure or collapse of embankment caused by water saturation of fill due to blockage of culvert leading to build up of water, surcharge from impounded water and saturation of fill due to prolonged rainfall. • Displacement / failure of embankment leading to loss of track support. • Surface cracking of crest and embankment batters due to mining-induced vertical or horizontal ground movements, leading to erosion of batters and long-term embankment instability. • Cracking within embankment due to mining-induced vertical or horizontal ground movements and build up of water within embankment, flowing through cracks, leading to piping failure and formation of sink holes under the track • Cracking of culvert causing loss of fill due to pot holing (vertical) due to mining-induced ground movements, particularly valley closure, leading to development of sinkhole and undermining track **Note:** Refer to other sections of the Risk Control Procedures for managing risks associated with changes in track geometry or changes to culverts	**<u>LEVEL 2</u>** **Rate of change in crest extensometer distance exceeds 20 mm within 2 hours or Tension crack observed along the shoulder of the embankment within 4 m of the track, or across the access road, or slide in the crest of the embankment along the access road within 4 m of the track**	Contact Train Control & introduce track speed of 20km/h. If not already on site at time of alarm, inspect track and embankment at trigger point. Remain on site until such time that RMG agree that continuous 24 hour / 7 days a week presence by Track Certifier is not required.	Immediately If not on site at time of alarm, immediate callout and arrive as soon as reasonably practicable (target less than 2 hours)	RMC
		Undertake additional geotechnical inspection and appraisal	As soon as reasonably practicable	PSM
		RSRG meet and review latest monitoring information from automated and manually acquired data for the embankment, culvert and the track, inspections by geotechnical engineer and Track Certifier, and latest weather forecasts. RSRG consider whether any additional management measures are required, which may include: - stop trains - temporarily support the ballast shoulder by placing material on the crest of the embankment - place permanent or temporary fill / rock spall to the base of the embankment - tip fill material into scarp of slide until settlement effectively ceases - increase monitoring and reporting procedures - arrange additional surveys to monitor displacement, if required - consider whether to recommend additional Governance Meeting between Tahmoor Coal and ARTC (emergency response)	Within 15 minutes	RSRG
		Report trigger exceedance and actions taken to RMG, ARTC, MSO & ONRSR	Within 24 hours	TC
	<u>LEVEL 3</u> **Tension crack observed across the access road and under the track, or slump removes access road support for the embankment, or a report of depression in the track by train driver**	Contact Train Control & introduce track speed of 20km/h. If not already on site at time of alarm, inspect track and embankment at trigger point. Remain on site until such time that RMG agree that continuous 24 hour / 7 days a week presence by Track Certifier is not required.	Immediately If not on site at time of alarm, immediate callout and arrive as soon as reasonably practicable (target less than 2 hours)	RMC
		Undertake additional geotechnical inspection and appraisal	As soon as reasonably practicable	PSM
		RSRG meet and review latest monitoring information from automated and manually acquired data for the embankment, culvert and the track, inspections by geotechnical engineer and Track Certifier, and latest weather forecasts. RSRG consider whether any additional management measures are required, which may include: - stop trains - temporarily support the ballast shoulder by placing material on the crest of the embankment - place permanent or temporary fill / rock spall to the base of the embankment - tip fill material into scarp of slide until settlement effectively ceases - add ballast to the railway track and lift track to restore track geometry - provide additional forms of track support under the track as may be appropriate or feasible - increase monitoring and reporting procedures - arrange additional surveys to monitor displacement, if required - consider whether to recommend additional Governance Meeting between Tahmoor Coal and ARTC (emergency response)	Within 15 minutes	RSRG
		Report trigger exceedance and actions taken to RMG, ARTC, MSO & ONRSR	Within 24 hours	TC

Table A. 1 Risk Control Procedures for LWs S1A-S7A (continued)

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
Embankments • Embankment slope failure or collapse of embankment caused by water saturation of fill due to blockage of culvert leading to build up of water, surcharge from impounded water and saturation of fill due to prolonged rainfall. • Displacement / failure of embankment leading to loss of track support. • Surface cracking of crest and embankment batters due to mining-induced vertical or horizontal ground movements, leading to erosion of batters and long-term embankment instability. • Cracking within embankment due to mining-induced vertical or horizontal ground movements and build up of water within embankment, flowing through cracks, leading to piping failure and formation of sink holes under the track • Cracking of culvert causing loss of fill due to pot holing (vertical) due to mining-induced ground movements, particularly valley closure, leading to development of sinkhole and undermining track **Note:** Refer to other sections of the Risk Control Procedures for managing risks associated with changes in track geometry or changes to culverts	**Forecast of extreme wet weather, as observed by RMG or notified by ARTC to RMC**	RMG meet and review latest monitoring information from automated and manually acquired data for the embankment, culverts and the track, inspections by geotechnical engineer and Track Certifier, and details of extreme wet weather forecast. RMG consider whether any additional management measures are required, which may include: - sealing cracks that may have developed during mining, prior to the weather event - additional inspection by geotechnical engineer to assess whether additional work may be required prior to weather event - additional inspection or monitoring equipment to prepare for weather event - bring forward ground surveys if their scheduled timing coincides with weather event - develop extreme wet weather plan, which may include arranging for Track Certifier on site during weather event, periodic checking of automated monitoring data during event, reporting and communication protocol during weather event.	As soon as reasonably practicable depending on severity and timing of weather event (target less than 24 hours)	RMG
		Report outcome of weather event to RMG, ARTC, MSO & ONRSR in Railway Status Report	Within one week	MSEC
	Water level at Culvert Inlets at 99.338 km, 100.121 km and 100.425 km reaches culvert obvert	Inspect embankment for flooding and condition of embankment and culvert	Immediate callout as soon as reasonably practicable (target less than 2 hours)	RMC
		RRG meet and review latest monitoring information from automated and manually acquired data for the embankment, culvert and the track, inspections by geotechnical engineer and Track Certifier, current weather observations and details of latest weather forecast. RRG consider whether any additional management measures are required, which may include: - continue visual monitoring by RMC until end of weather event - remove cause of blockage of culvert (if any and if possible) - decide whether to slow or stop trains based on other monitoring data	Within 15 minutes	RRG
		Report trigger exceedance and actions taken to RMG, ARTC, MSO & ONRSR in Railway Status Report	Within one week	MSEC
Conveyor Crossing • Loss of integrity of conveyor crossing structure.	**GREEN**	Follow general procedures (including trestle survey, laser distancemeters and visual inspections)	-	-
	Closure between trestles exceeds 10 mm	Notify RMG	Within one week	RMC
		RMG meet and consider whether any additional management measures are required, which may include: - undertake structural inspection - increase monitoring and reporting procedures - elongate bolt holes in trestle column baseplates - strengthen trestle columns - install additional cable-stay bracing - erect temporary support structure on the access roadways on either side of railway	RMG meet via teleconference within one week	RMG
		Report trigger exceedence and RMG decisions to ARTC, MSO, ONRSR and SA NSW	Within one week	TC
Damage to boundary fences potentially leading to: • Livestock entry into rail corridor	**GREEN**	Follow general procedures (including visual inspections within rail corridor)	-	-
	Damage to fence	Repair fence	As required	RMC
		Report impact and actions taken to RMG	Within one week	RMC

Table A. 1 Risk Control Procedures for LWs S1A-S7A (continued)

<table>
<tr><th>RISK ISSUE</th><th>TRIGGER</th><th>CONTROL PROCEDURES</th><th>TIMING & FREQ</th><th>BY WHOM?</th></tr>
<tr><td rowspan="8">Bridges
• Impact on serviceability of bridge resulting in unplanned maintenance.

<table><tr><th>Trigger Level</th><th>Measured opening or closure between bridge abutments (beyond seasonal fluctuation)</th></tr><tr><td>GREEN</td><td>-</td></tr><tr><td>MONITORING REVIEW POINT TRIGGER</td><td>Remembrance Drive Bridge over Bargo River > 7 mm
Railway Viaduct > 5 mm
Bargo River Road Overbridge (Potter’s Cutting) > 5 mm
Wellers Road Overbridge > 5 mm
Increase in crack widths by more than 3 mm in widths to Viaduct or Bridges</td></tr></table></td><td>GREEN</td><td>Follow general procedures (including GNSS monitoring, ground and structure surveys, and visual inspections).</td><td>-</td><td>-</td></tr>
<tr><td rowspan="3">Monitoring Review Point Trigger for Railway Viaduct</td><td>Notify RMG, Bridge Technical Committee and ARTC (incl. ARTC Structures Specialist)</td><td>Within one week</td><td>MSEC</td></tr>
<tr><td>RMG meet and consider whether any additional management measures are required, which may include:
- undertake structural inspections
- measure changes to crack gauges
- increase frequency of surveys and inspections and reporting
- install temporary track strengthening baulk
- force closure to focus in desired Span 5 by diamond saw cut
- repair cracked masonry
- provide additional support to the arch and parapet walls
- fabricate and erect structural steel supports for the arch
- adjust rail stress
- adjust track geometry
- implement temporary speed restriction or stop trains
- continual review of rate of development of valley closure relative to longwall progress and consider whether to amend the Valley closure trigger of 20 mm
- consider whether to recommend to TC senior management to slow or stop mining if impact to rail operations is unacceptable to ARTC</td><td>As required</td><td>RMG & Bridge Technical Committee</td></tr>
<tr><td>Report trigger exceedence and RMG & Bridge Technical Committee decisions to ARTC, MSO, ONRSR and SA NSW</td><td>Within 24 hours</td><td>Tahmoor Coal</td></tr>
<tr><td rowspan="3">Valley closure at Railway Viaduct > 20 mm

(based on Precision 2D surveys of closure between ground marks located in stable ground at both ends of the Viaduct)</td><td>Stop longwall mining</td><td>Immediately
(subject to mine safety requirements)</td><td>TC</td></tr>
<tr><td>RMG meet and consider whether any additional management measures are required, which may include:
- fabricate and erect structural steel supports for the arch
- consider and implement measures to monitor the condition of the temporary support structures
- consider triggers for adjusting the support structures due to residual subsidence
- adjust the support structures to accommodate residual subsidence movements, if required
- consider works required to permanently restore the Railway Viaduct in consultation and approval by ARTC and government agencies.</td><td>As required</td><td>RMG</td></tr>
<tr><td>Report trigger exceedence and RMG decisions to ARTC, MSO, ONRSR and SA NSW</td><td>Within 24 hours</td><td>TC</td></tr>
<tr><td rowspan="3">Monitoring Review Point Trigger for Remembrance Drive Bridge over Bargo River</td><td>Notify RMG, Bridge Technical Committee and ARTC (incl. ARTC Structures Specialist)</td><td>Within one week</td><td>MSEC</td></tr>
<tr><td>RMG meet and consider whether any additional management measures are required, which may include:
- undertake structural inspections
- increase frequency of surveys and inspections and reporting
- construct temporary props and/or cross-bracing to provide additional support to the piers
- repair cracks in concrete elements
- replace bridge bearings
- resurface affected road pavement
- consider whether to recommend to TC senior management to slow or stop mining if impact to rail operations is unacceptable to ARTC</td><td>As required</td><td>RMG & Bridge Technical Committee</td></tr>
<tr><td>Report trigger exceedence and RMG & Bridge Technical Committee decisions to ARTC, MSO, ONRSR and SA NSW</td><td>Within 24 hours</td><td>Tahmoor Coal</td></tr>
</table>

Table A. 1 Risk Control Procedures for LWs S1A-S7A (continued)

<table>
<tr><th>RISK ISSUE</th><th>TRIGGER</th><th>CONTROL PROCEDURES</th><th>TIMING & FREQ</th><th>BY WHOM?</th></tr>
<tr><td rowspan="3">Bridges
• Impact on serviceability of bridge resulting in unplanned maintenance.

<table><tr><th>Trigger Level</th><th>Measured opening or closure between bridge abutments (beyond seasonal fluctuation)</th></tr><tr><td>GREEN</td><td>-</td></tr><tr><td>MONITORING REVIEW POINT TRIGGER</td><td>Remembrance Drive Bridge over Bargo River > 7 mm
Railway Viaduct > 5 mm
Bargo River Road Overbridge (Potter’s Cutting) > 5 mm
Wellers Road Overbridge > 5 mm
Increase in crack widths by more than 3 mm in widths to Viaduct or Bridges</td></tr></table></td><td rowspan="3">Monitoring Review Point Trigger for Bargo River Road Overbridge or Wellers Road Overbridge</td><td>Notify RMG, Bridge Technical Committee and ARTC (incl. ARTC Structures Specialist)</td><td>Within one week</td><td>MSEC</td></tr>
<tr><td>RMG meet and consider whether any additional management measures are required, which may include:
- undertake structural inspections
- measure changes to crack gauges
- increase frequency of surveys and inspections and reporting
- install roller steel reinforcement straps to the underside of the concrete arch;
- install mesh to underside of the arch;
- install temporary support structure within the road pavement to provide temporary support to arch;
- provide additional support to parapet walls; and/or
- repair cracked brickwork
- consider whether to recommend to TC senior management to slow or stop mining if impact to rail operations is unacceptable to ARTC</td><td>As required</td><td>RMG & Bridge Technical Committee</td></tr>
<tr><td>Report trigger exceedence and RMG & Bridge Technical Committee decisions to ARTC, TfNSW, MSO, ONRSR and SA NSW</td><td>Within 24 hours</td><td>Tahmoor Coal</td></tr>
</table>

Table A. 1 Risk Control Procedures for LW S4A-S7A

GENERAL TRIGGER LEVELS

Trigger Level	Description
GREEN	Observations within operating tolerance. Operate as normal.
BLUE	Observations within operating tolerance but nearing limits. Investigate cause. Some action may be required to prevent operating restrictions. Immediately inspect site unless it is obvious that the cause of the trigger cannot be due to physical damage to rail infrastructure. Otherwise inspect within 24 hours. Return status to Green level.
YELLOW	Restrictions on operations. Immediate site inspection. Action required within 6 hours. Appropriate speed restriction may apply until altered to Green or Blue Level.
RED	Stop trains, inspect prior to next train, repair to lower category, pilot trains if safe.

ABBREVIATIONS WITHIN THESE TABLES:

CRN = Country Regional Network

ARTC = Australian Rail Track Corporation

MSI = NSW Department of Regional NSW – Mine Safety Inspectorate – Resources Regulator

ONRSR = Office of the National Rail Safety Regulator

SRS = Southern Rail Surveys (ground surveys within rail corridor)

SA NSW = Subsidence Advisory NSW

MSEC = Mine Subsidence Engineering Consultants

RMG = Rail Management Group

RMC = Rail Maintenance Contractor

PCE = Pidgeon Civil Engineering

JMA = JMA Solutions (structural engineer)

SMEC = SMEC (ground surveys beyond rail corridor)

TC = Tahmoor Coal

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
General Procedures				
	GREEN	**EARLY WARNING MONITORING**		
		Continuous GNSS monitoring for S1 to S15 as shown in Drawing No. MSEC1201-03	GNSS units S1 to S15 installed Continuous readings, with data averaged over 24 hours and recorded once per day until end of LW S6A.	Tahmoor Coal (Geomatix)
		Continuous GNSS monitoring at 100.70 km (S28)	Install prior to start of LW S4A Continuous readings, with data averaged over 24 hours and recorded once per day until end of LW S6A.	Tahmoor Coal (Geomatix)
		RAILWAY TRACK		
		3D ground survey along rail corridor *Extents for 3D surveys:* LW S4A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 400 metres in front of the LW face, up to 98.74 km. (End of LW from 100.90km to 98.38km)* LW S5A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 400 metres in front of the LW face, up to 99.10 km. (End of LW from 101.16km to 98.92km)* LW S6A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 400 metres in front of the LW face, up to 99.46 km. (End of LW from 101.16km to 99.28km)* LW S7A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 400 metres in front of the LW face, up to 99.46 km. (End of LW from 101.16km to 99.28km)*	Monthly 3D surveys commencing as per below: LW S4A: at LW start LW S5A: at LW start LW S6A: at LW start LW S7A: at LW start Surveys continue until 800m of extraction of each LW unless ongoing adverse changes are observed End of LW S4A-S7A.	SRS
		Focussed 2D ground survey along rail corridor *Extents for focussed 2D surveys:* LW S4A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 200 metres in front of the LW face, up to 98.74 km. (End of LW from 100.90km to 98.38km)* LW S5A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 200 metres in front of the LW face, up to 99.10 km. (End of LW from 101.16km to 98.92km)* LW S6A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 200 metres in front of the LW face, up to 99.46 km. (End of LW from 101.16km to 99.28km)* LW S7A: *101.16km to 100.14km (AP6) and then extend to the north to include pegs that are at least 200 metres in front of the LW face, up to 99.46 km. (End of LW from 101.16km to 99.28km)*	Weekly 2D surveys commencing as per below: LWs S4A-S7A: start after GNSS at 100.70km subsides more than 20mm after LW start or 200m extraction, whichever occurs first Surveys continue until 800m of extraction of each LW unless ongoing adverse changes are observed End of LW S4A-S7A.	SRS
		Continuously monitor rail stress, rail temperature and switch displacement *Extents for active subsidence monitoring:* LW S4A: *101.10km to 100.14km (AP6) and then extend to the north to include gauges that are at least 200 metres in front of the LW face, up to 98.74 km.* LW S5A: *101.10km to 100.14km (AP6) and then extend to the north to include gauges that are at least 200 metres in front of the LW face, up to 99.10 km.* LW S6A: *101.10km to 100.14km (AP6) and then extend to the north to include gauges that are at least 200 metres in front of the LW face, up to 99.46 km.* LW S7A: *101.10km to 100.14km (AP6) and then extend to the north to include pegs that are at least 200 metres in front of the LW face, up to 99.46 km. (End of LW from 101.16km to 99.28km)*	Readings every 5 minutes LWs S4A-S7A: at LW start	Globetech
		Track geometry surveys using Amber track mounted device or equivalent *Extents for track geometry surveys as per focussed 2D surveys*	Weekly as per focussed 2D surveys	RMC
		Track inspection by qualified track certifier. The inspection will check ARTC infrastructure within the rail corridor, including the track, integrity of monitoring systems, cuttings and Wellers Road Overbridge *The extent of visual inspections is the same as the extent of track geometry surveys plus dormant expansion switches*	Daily LWs S4A-S7A: start after GNSS at 100.70km subsides more than 20mm after LW start or 200m extraction, whichever occurs first Inspections continue until 800m of extraction of each LW unless ongoing adverse changes are observed	RMC
		CUTTINGS		
		Absolute 3D surveys every 20 metres along the crests and/or toes of the cuttings *Install Cutting at 101.162 km prior to start of LW S5A*	Monthly / weekly as described for railway track Surveys continue until 800m of extraction of each LW unless ongoing adverse changes are observed End of LW S4A-S7A	SRS
		Visual inspection of cuttings by geotechnical engineer	Monthly / weekly as described for railway track Inspections continue until 800m of extraction of each LW unless ongoing adverse changes are observed	Newcastle Geotech

<table>
<tr><th>RISK ISSUE</th><th>TRIGGER</th><th>CONTROL PROCEDURES</th><th>TIMING & FREQ</th><th>BY WHOM?</th></tr>
<tr><td rowspan="11">General Procedures (continued)</td><td rowspan="11">GREEN</td><td colspan="3">BRIDGES</td></tr>
<tr><td>Pre-mining inspection and structural assessment of Wellers Road Overbridge</td><td>Complete</td><td>JMA</td></tr>
<tr><td>Geological inspection and mapping at Cutting at Wellers Road Overbridge</td><td>Complete</td><td>Newcastle Geotech</td></tr>
<tr><td>Continuous GNSS monitoring including S15 (Wellers Road Overbridge) as shown in Drawing No. MSEC1193-01-01</td><td>GNSS units installed
Continuous readings, with data averaged over 24 hours and recorded once per day until end of LW S7A.</td><td>Tahmoor Coal
(Geomatix)</td></tr>
<tr><td>Conduct Local 3D survey of structure and ground marks on the Wellers Road Overbridge as per Drawing No. MSEC1193-19-02. Survey will include measurement of change in height between track and underside of arch, as requested by ARTC.</td><td>Install and baseline survey prior to LW S1A.
Monthly after 200m extraction of LWs S4A to S7A
Surveys continue until 800m of extraction of each LW unless ongoing adverse changes are observed
End of LW S1A-S7A.</td><td>Tahmoor Coal
(SRS)</td></tr>
<tr><td>Automated, continuous monitoring of laser distancemeters and draw wire displacement sensors along and across the Overbridge at base of arch</td><td>Installed and operating
Readings every 15 minutes</td><td>Tahmoor Coal
(Sweeting Consulting)</td></tr>
<tr><td>Monitoring of existing cracks with crack gauges on Wellers Road Overbridge</td><td>Install and baseline survey prior to LW S4A.
Monthly after 200m extraction of LWs S4A to S7A
Inspections continue until 800m of extraction of each LW unless ongoing adverse changes are observed
End of LW S1A-S7A.</td><td>TC</td></tr>
<tr><td colspan="3">OTHER MEASURES</td></tr>
<tr><td>Undertake investigations as required to assist in identifying potential locations of non-conventional movement. Reconsider management measures in light of new information that becomes available.</td><td>Ongoing</td><td>RMG</td></tr>
<tr><td>Dilapidation inspections</td><td>Complete</td><td>Various</td></tr>
<tr><td>Standard ARTC maintenance and control procedures
- Twice weekly track patrol
- AK track recording car
- Base Operating Standards Mandatory Responses
- Driver reports and temporary speedboards
- Signalling and Communications procedures
- Ultrasonic rail test (high rail)</td><td>As per ARTC procedures</td><td>ARTC</td></tr>
<tr><td>Analyse and report results to RMG</td><td>Monthly</td><td>Section 6.1</td></tr>
<tr><td>RMG discuss results and consider whether any additional management measures are required</td><td>Monthly
LWs S4A-S7A: start after GNSS at 100.70km subsides more than 20mm after LW start or 200m extraction, whichever occurs first</td><td>RMG</td></tr>
<tr><td>RMG discuss progress with MSI and ONRSR</td><td>As required</td><td>RMG</td></tr>
<tr><td rowspan="3">Bridges
Impact on serviceability of bridge resulting in unplanned maintenance.
<table><tr><th>Trigger Level</th><th>Measured opening or closure between bridge abutments (beyond seasonal fluctuation)</th></tr><tr><td>GREEN</td><td>-</td></tr><tr><td>MONITORING REVIEW POINT TRIGGER</td><td>Wellers Road Overbridge > 5 mm
Increase in crack widths by more than 3 mm in widths</td></tr></table></td><td rowspan="3">Monitoring Review Point Trigger</td><td>Notify RMG, Bridge Technical Committee and TfNSW, ARTC (incl. ARTC Structures Specialist)</td><td>Within one week</td><td>MSEC</td></tr>
<tr><td>RMG meet and consider whether any additional management measures are required, which may include:
- undertake additional structural inspections
- install and measure changes to additional crack gauges
- increase frequency of surveys and inspections and reporting
- install roller steel reinforcement straps to the underside of the concrete arch;
- install mesh to underside of the arch;
- install temporary support structure within the road pavement to provide temporary support to arch;
- provide additional support to parapet walls; and/or
- repair cracked brickwork
- consider whether to recommend to TC senior management to reduce vehicle loads if impact to rail operations is unacceptable to TfNSW or ARTC
- consider whether to recommend to TC senior management to amend start position of future longwalls further away from Overbridge based on analysis of monitoring data</td><td>As required</td><td>RMG</td></tr>
<tr><td>Report trigger exceedence and RMG decisions to TfNSW, ARTC, MSI, ONRSR and SA NSW</td><td>Within 24 hours</td><td>Tahmoor Coal</td></tr>
</table>

Table 4.1 Risk Control Procedures during the extraction of Tahmoor LW S1A-S7A

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Local roads	Cracking, heaving or stepping of the pavements or unsealed surfaces	Medium / Low	None	Conduct geotechnical assessment of Remembrance Driveway embankments and cutting	Complete	Douglas Partners
				Continuous GNSS monitoring as shown in Drawing No. MSEC1193-01-01	GNSS units installed Continuous readings, with data averaged over 24 hours and recorded once per day until end of LW S7A.	Tahmoor Coal (Unit Zero)
				2D survey line along Tahmoor Mine property boundary	Pegs installed. Baseline survey complete. Monthly survey during LW S1A between 200m and 1300m extraction, and continue if ongoing adverse movements are observed. End of LW S1A (complete).	Tahmoor Coal (SMEC)
				Conduct 2D / Absolute 3D surveys along Main Southern Railway in accordance with Railway Management Plan	Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone during LWs S1A to S7A	Tahmoor Coal (SRS)
				Conduct 2D survey along Charlies Point Road	Pegs installed. Baseline survey complete Monthly survey during LWs S1A-S5A between 200m and 800m extraction, and continue if ongoing adverse movements are observed. End of LW S1A-S7A.	Tahmoor Coal (SMEC)
				Conduct 2D / Absolute 3D surveys along Remembrance Drive	Pegs installed. Baseline survey complete. Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S1A: start after 1300m extraction LW S2A: start after 900m extraction LW S3A: start after 500m extraction LW S4A: start after 200m extraction LW S5A: start after GNSS 28 subsides more than 20 mm due to LW S5A or 200m extraction, whichever occurs first LW S6A: start after GNSS 28 subsides more than 20 mm due to LW S5A or 200m extraction, whichever occurs first Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of LW S1A-S7A.	Tahmoor Coal (SMEC)
				Conduct 2D surveys along Caloola Road	Pegs installed. Baseline survey complete. Survey at end of LW S1A. Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S2A: start after 900m extraction LW S3A: start after 800m extraction LW S4A: start after 800m extraction LW S5A: start after 900m extraction LW S6A: start after 900m extraction Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of LW S2A-S7A.	Tahmoor Coal (SMEC)
				Conduct 2D surveys along Yarran Road	Install and baseline survey complete. Survey at end of LW S3A. Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S4A: start after 200m extraction LW S5A: start after 200m extraction LW S6A: start after 200m extraction LW S7A: start after 200m extraction Continue if ongoing adverse movements are observed. End of LW S4A-S7A.	Tahmoor Coal (SMEC)

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
				Conduct 2D surveys along Great Southern Road	Install and baseline survey complete. Survey at end of LW S3A. Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S4A: start after 200m extraction LW S5A: start after 200m extraction LW S6A: start after 200m extraction Continue if ongoing adverse movements are observed. End of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Conduct Local 3D / Absolute 3D survey of Remembrance Drive Embankment over Teatree Hollow at Caloola Drive (RE4) as per Drawing No. MSEC1193-03-07.	Install and baseline survey complete. Monthly 3D / Weekly 2D surveys within active subsidence zone commencing as per below: LW S2A: start after 900m extraction LW S3A: start after 800m extraction LW S4A: start after 800m extraction LW S5A: start after 900m extraction Continue if ongoing adverse movements are observed. End of LW S2A-S6A.	Tahmoor Coal (SMEC)
				Conduct Local 3D / Absolute 3D survey of Remembrance Drive Embankment over Tributary to Teatree Hollow north of Yarran Road (RE3) as per Drawing No. MSEC1193-03-08.	Install and baseline survey complete. 3D Survey at end of LW S3A. Monthly 3D / Weekly 2D surveys within active subsidence zone commencing as per below: LW S4A: start after 300m extraction LW S5A: start after 400m extraction LW S6A: start after 400m extraction Continue if ongoing adverse movements are observed. End of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Conduct Local 3D / Absolute 3D survey of Remembrance Drive Embankment over Tributary to Teatree Hollow south of Yarran Road (RE2) as per Drawing No. MSEC1193-03-09.	Install and baseline survey complete. 3D Survey at end of LW S3A. Monthly 3D / Weekly 2D surveys within active subsidence zone commencing as per below: LW S4A: start after 200m extraction LW S5A: start after 200m extraction LW S6A: start after 200m extraction Continue if ongoing adverse movements are observed. End of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Conduct Local 3D / Absolute 3D survey of Remembrance Drive Embankment at intersection of Wellers Road (RE1) as per Drawing No. MSEC1193-03-10.	Install and baseline survey prior to LW S5A. 3D Survey at end of LW S5A. Monthly 3D after 200m extraction of LW S6A until 800m of extraction and continue if ongoing adverse movements are observed. End of LW S6A and S7A.	Tahmoor Coal (SMEC)
				Conduct Local 3D / Absolute 3D survey of Remembrance Drive Cutting (RC1) as per Drawing No. MSEC1193-03-11.	Install and baseline survey complete. 3D Survey at end of LW S2A. Monthly 3D / Weekly 2D surveys within active subsidence zone commencing as per below: LW S3A: start after 500m extraction LW S4A: start after 400m extraction LW S5A: start after 400m extraction LW S6A: start after 500m extraction Continue if ongoing adverse movements are observed. End of LW S3A-S7A.	Tahmoor Coal (SMEC)
				Detailed visual inspections of local roads, culverts, embankments and cuttings	Weekly for areas within the active subsidence zone during LWs S1A to S7A and continue if ongoing adverse movements or impacts are observed until one month after the extraction of each LW.	Tahmoor Coal
				Detailed visual inspections by geotechnical engineer along Remembrance Driveway embankments and cutting	Monthly during periods of active subsidence of LW S2A to S7A, and continue if ongoing adverse movements are observed.	Douglas Partners
				Prepare traffic management plan for installation and measurement of survey pegs to satisfaction of WSC	Complete	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
				Prepare traffic management plan to manage traffic along Remembrance Drive in the event that mining-induced damage requires repair	Complete	Tahmoor Coal
				Apply to Council and obtain an approved Road Occupancy Permit under Section 138 of the Roads Act prior to conducting works in the road reserve, including survey.	Complete	Tahmoor Coal
				Analyse and report results to IMG	Weekly during LW S1A-S7A after the length of the extraction exceeds 200 metres.	Tahmoor Coal
				IMG discuss results and consider whether any additional management measures are required	Weekly during LW S1A-S7A after the length of the extraction exceeds 200 metres.	Tahmoor Coal
Local roads	Cracking, heaving or stepping of the pavements or unsealed surfaces	Medium / Low	Impacts occur to pavement	Notify all stakeholders, including WSC, Tahmoor Coal, Subsidence Advisory NSW and Resources Regulator	Within one week	Tahmoor Coal / WSC
				IMG, Tahmoor Coal and WSC meet to decide whether any additional management measures are required, including: - increase in frequency of surveys and visual inspections - increase in monitoring reporting - repair pavement in accordance with Traffic Management Plans	As required (target within 48 hours)	Tahmoor Coal / WSC
				Repair road in consultation with WSC	As required	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons on public property or, or WSC property and cannot be controlled	IMG, Tahmoor Coal and WSC meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area, including diversion of traffic via Traffic Management Plan	Immediately	Tahmoor Coal / WSC
				Notify SRG of trigger exceedence and any management decisions undertaken (incl Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal
Drainage culverts	Cracking or spalling	Low	None	Conduct baseline CCTV investigations of culverts within the Study Area	Prior to each culvert experiencing active subsidence	Tahmoor Coal
				Conduct Austroads Level 1 inspection of culverts within the Study Area	Prior to each culvert experiencing active subsidence	Tahmoor Coal
				Conduct survey of levels at inlet and outlet of culverts within the Study Area	Prior to each culvert experiencing active subsidence End of LW S7A	Tahmoor Coal (SMEC)
				Conduct ground surveys along streets, which cross over the culverts	Refer local roads section	Tahmoor Coal (SMEC)
				Conduct visual inspection for impacts	Refer local roads section	Tahmoor Coal (SMEC)
			Impacts occur	Notify all stakeholders, including WSC, Tahmoor Coal, Subsidence Advisory NSW and Resources Regulator	Within one week	Tahmoor Coal / WSC
				Repair culvert in consultation with WSC	As required	Tahmoor Coal
Causeway on Government Drive	Cracking or spalling of concrete pavement or culvert	Low	None	Conduct ground survey along causeway	Install and baseline survey by Nov 2022. Survey at end of LWs S1A, S2A and S3A Monthly surveys between 200m and 1000m of extraction of LWs S4A to S7A and continue if ongoing adverse movements are observed. Survey at end of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Visual inspection of causeway	Baseline inspection by Nov 2022 Inspect at end of LWs S1A, S2A and S3A Monthly inspections between 200m and 1000m of extraction of LWs S4A to S7A and continue if ongoing adverse movements are observed. Inspect at end of LW S4A-S7A.	Tahmoor Coal (BIS)
			Impacts occur	Notify all stakeholders, including WSC, Tahmoor Coal, Subsidence Advisory NSW and Resources Regulator	Within one week	Tahmoor Coal / WSC
				Repair causeway in consultation with WSC	As required	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Remembrance Drive embankments	Displacement / failure of embankment leading to loss of support of pavement	Low	None	Ensure culverts are clear and free flowing	Prior to influence of LWs S1A to S7A and during periods of active subsidence	Tahmoor Coal
				Conduct ground surveys along crest and toe of both sides of Remembrance Drive embankments	Refer local roads section	Tahmoor Coal (SMEC)
				Conduct visual inspection of embankments and culverts	Refer local roads section	Tahmoor Coal (SMEC)
			Level 1 Change in distance across crest exceeds 25 mm Rate of change in distance across crest is greater than 10 mm in a week Visual signs of distress to embankment, such as tension crack along edge of embankment / access road Visual signs of distress to dam walls upstream of Remembrance Drive	Notify IMG	Within 24 hours	Tahmoor Coal
				Undertake additional geotechnical inspection and appraisal	Within 24 hours	Douglas Partners
				IMG meet and review latest monitoring information for the embankment, culvert and the pavement, inspections by geotechnical engineer and building inspector, and latest weather forecasts. IMG consider whether any additional management measures are required, which may include: - fill and seal cracks and/or regrade drainage line - increase monitoring frequency and reporting procedures - arrange additional monitoring locations to monitor potential displacement of embankment material - lower water level of dam(s) upstream of embankment (if relevant) - install variable message signs in preparation of potential traffic management measures	Within 24 hours	IMG
				Report trigger exceedance and actions taken to IMG, WSC, SA NSW & MSO in Status Report	Within 24 hours if tension crack observed Otherwise within one week	Tahmoor Coal
			Level 2 Tension crack observed along the embankment shoulder, or slide in the crest of the embankment	Notify IMG and WSC.	Immediately	Tahmoor Coal
				WSC inspection to consider and implement emergency traffic management measures, if required	Immediately	Tahmoor Coal / WSC
				Undertake additional geotechnical inspection and appraisal	As soon as reasonably practicable	Douglas Partners
				IMG meet and review latest monitoring information for the embankment, culvert and the pavement, inspections by geotechnical engineer and building inspector, and latest weather forecasts. IMG consider whether any additional management measures are required, which may include: - introduce temporary speed restriction or temporarily close affected shoulder and/or travel lane - place permanent or temporary fill / rock spall to the base of the embankment - increase monitoring frequency and reporting procedures - arrange additional monitoring locations to monitor potential displacement of embankment material	As soon as reasonably practicable	IMG
				Report trigger exceedance and actions taken to IMG, WSC, SA NSW & MSO	Within 24 hours	Tahmoor Coal
			Level 3 Tension crack observed across the pavement shoulder and travel lane(s), or slump or depression appears in the pavement	Notify IMG and WSC.	Immediately	Tahmoor Coal
				WSC inspection to consider and implement emergency traffic management measures, if required	Immediately	Tahmoor Coal / WSC
				Undertake additional geotechnical inspection and appraisal	As soon as reasonably practicable	Douglas Partners
				IMG meet and review latest monitoring information for the embankment, culvert and the pavement, inspections by geotechnical engineer and building inspector, and latest weather forecasts. IMG consider whether any additional management measures are required, which may include: - introduce temporary speed restriction or temporarily close affected shoulder and/or travel lane - place permanent or temporary fill / rock spall to the base of the embankment - resurface pavement to restore ride quality along travel lanes - provide additional forms of support under the pavement as may be appropriate or feasible - increase monitoring frequency and reporting procedures - arrange additional monitoring locations to monitor potential displacement of embankment material	As soon as reasonably practicable	IMG
				Report trigger exceedance and actions taken to IMG, WSC, SA NSW & MSO	Within 24 hours	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Remembrance Drive cutting	Blockage of drainage lines or deformation of pavement in the cutting	Low	None	Scale the cutting batter slopes to remove loose debris and rocks Clear the cutting drainage lines and maintain the drainage lines to ensure that they remain free of debris and vegetation during mining	Prior to LW S2A and as required	Tahmoor Coal
				Conduct ground surveys along crest and toe of both sides of Remembrance Drive cutting	Refer local roads section	Tahmoor Coal (SMEC)
				Conduct visual inspection of cutting	Refer local roads section	Tahmoor Coal (SMEC)
			Closure across cutting exceeds 20 mm	Notify IMG	Within one week	MSEC
				IMG meet and consider whether any additional management measures are required, which may include: - undertake geotechnical engineering inspection - increase monitoring frequency and reporting procedures	Within one week	IMG
				Report trigger exceedance and actions taken to IMG, WSC, SA NSW & MSO in Status Report	Within one week	Tahmoor Coal
			Instability observed to cuttings	Notify IMG and WSC.	Immediately	Tahmoor Coal
				IMG meet and consider whether any additional management measures are required, which may include: - undertake geotechnical engineering inspection - increase monitoring frequency and reporting procedures - clear debris from drainage lines at base of cutting faces	Within 24 hours	IMG
				Report trigger exceedance and actions taken to IMG, WSC, SA NSW & MSO in Status Report	Within one week	Tahmoor Coal
Bridges	Loss of serviceability of Bridges	Low	None	Pre-mining inspection and structural assessment of Bridges	Complete	JMA
				Geological inspection and mapping at Bargo River Road Bridge	Complete	Newcastle Geotech
				Review of monitoring measures for Rockford Road Bridge and Arina Road Bridge and implement, if required	Prior to start of LW S1A (complete)	Bridge Technical Committee / Tahmoor Coal
				Review by Bridge Technical Committee and modify planned management and monitoring measures for Bargo River Bridge and Kader Street Bridge and review planned management measures for Rockford Road Bridge and Arina Road Bridge and implement, if required	Complete	Bridge Technical Committee / Tahmoor Coal
				Brief WSC on planned management and monitoring measures for Bargo River Bridge and Kader Street Bridge and review planned management measures for Rockford Road Bridge and Arina Road Bridge	Prior to 800 m of extraction of LW S1A	Tahmoor Coal
				Conduct Local 3D survey of structure and ground marks on the Bargo River Road Bridge as per Drawing No. MSEC1193-03-03, with one mark on the Bridge to be surveyed in Absolute 3D	Install and baseline survey complete. Monthly surveys between 1000m and one month after end of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A-S3A (complete).	Tahmoor Coal (SRS)
				Visual inspection of Bargo River Road Bridge	Baseline inspection complete Monthly inspections between 1000m and one month after end of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A to S3A (complete)	Tahmoor Coal
				Conduct Local 3D survey of structure and ground marks on the Rockford Road Bridge as per Drawing No. MSEC1193-03-04, with one mark on the Bridge to be surveyed in Absolute 3D	Install and baseline survey complete. Monthly surveys between 200m and 1000m of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A-S3A (complete).	Tahmoor Coal (SRS)
				Measure gaps between parapet kerbs and abutments of the Rockford Road Bridge	Install and baseline survey complete. Monthly surveys between 200m and 1000m of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A-S3A (complete).	Tahmoor Coal (SRS)
				Visual inspection of Rockford Road Bridge	Baseline inspection complete Monthly inspections between 200m and 1000m of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A to S3A (complete)	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
				Conduct Local 3D survey of structure and ground marks on the Arina Road Bridge as per Drawing No. MSEC1193-03-05, with one mark on the Bridge to be surveyed in Absolute 3D	Install and baseline survey complete. Monthly surveys between 200m and 1000m of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A-S3A (complete).	Tahmoor Coal (SRS)
				Measure gaps between vehicle kerbs and abutments of the Arina Road Bridge	Install and baseline survey complete. Monthly surveys between 200m and 1000m of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A-S3A (complete).	Tahmoor Coal (SRS)
				Visual inspection of Arina Road Bridge	Baseline inspection complete Monthly inspections between 200m and 1000m of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A to S3A (complete)	Tahmoor Coal
				Conduct Local 3D survey of structure and ground marks on the Kader Street Bridge as per Drawing No. MSEC1193-03-12, with one mark on the Bridge to be surveyed in Absolute 3D	Install and baseline survey complete. Survey at end of LWs S1A, S2A and S3A Monthly surveys between 200m and 1000m of extraction of LWs S4A to S7A and continue if ongoing adverse movements are observed. Survey at end of LW S4A-S7A.	Tahmoor Coal (SRS)
				Visual inspection of Kader Street Bridge	Baseline inspection by Nov 2022 Inspect at end of LWs S1A, S2A and S3A Monthly inspections between 200m and 1000m of extraction of LWs S4A to S7A and continue if ongoing adverse movements are observed. Inspect at end of LW S4A-S7A.	Tahmoor Coal
			GNSS unit S11 subsides or moves horizontally more than 20 mm	Conduct additional survey of Bargo River Road Bridge	Within one week	Tahmoor Coal (SRS)
				Visual inspection of Bargo River Road Bridge	Within one week	Tahmoor Coal
			Closure between bridge abutments exceeds 5 mm or transverse shear at Rockford Road Bridge exceeds 5 mm	Notify Bridge Technical Committee and WSC	Within one week	MSEC
				Bridge Technical Committee and WSC meet and consider whether any additional management measures are required, which may include: - undertake structural engineering inspection - increase monitoring frequency and reporting procedures - cut gaps between abutments and kerbs on Rockford Road Bridge or Arina Road Bridge - disconnect the bridge deck from one of the abutments on Bargo River Road Bridge and Kader Street Bridge - reset or replace bridge bearings - provide additional structural support to bridge deck	Within one week	Bridge Technical Committee
				Report trigger exceedance and actions taken to IMG, WSC, SA NSW & MSO in Status Report	Within one week	Tahmoor Coal
			Impacts observed to bridge	Notify Bridge Technical Committee and WSC	Within 24 hours	Tahmoor Coal
				WSC and Tahmoor Coal inspection to consider and implement emergency traffic management measures, if required	Immediately	Tahmoor Coal (JMA) / WSC
				Bridge Technical Committee and WSC meet and consider whether any additional management measures are required, which may include: - undertake structural engineering inspection - increase monitoring frequency and reporting procedures - cut gaps between abutments and kerbs on Rockford Road Bridge or Arina Road Bridge - disconnect the bridge deck from one of the abutments on Bargo River Road Bridge and Kader Street Bridge - reset or replace bridge bearings - repair damage to bridge, pavement approaches, and/or footpath approaches in consultation with WSC - as a last resort, slow or stop the longwall and/or vehicle traffic in accordance with Traffic Management Plan	Within 24 hours	Bridge Technical Committee
				Report trigger exceedance and actions taken to IMG, WSC, SA NSW & MSO in Status Report	Within 24 hours	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Bargo Cemetery	Damage to Cemetery ground, including grave sites, tombstones, kerbs, memorial wall, gardens and lawns	Low	None	Baseline recording and visual assessment by heritage consultant	Complete	EMM
				Pre-mining detailed visual inspection	Complete	Tahmoor Coal
				Conduct ground surveys along Charlies Point Road and Great Southern Road	Refer local roads section	Tahmoor Coal (SMEC)
				Conduct local 3D survey of survey marks around the Cemetery, including Pegs GSR-09 to GSR-17	Install and baseline survey prior to start of LW S4A Weekly surveys between 200m and 1000m of extraction of LWs S4A to S6A and continue if ongoing adverse movements are observed. Survey at end of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Conduct visual inspection of Cemetery	Weekly inspections between 200m and 1000m of extraction of LWs S4A to S6A and continue if ongoing adverse movements are observed. Inspection at end of LW S7A	Tahmoor Coal
			Impacts observed to Cemetery by TC or notification of impact by member of public	Notify WSC, TC and/or IMG	Immediately	Tahmoor Coal / WSC
				IMG meet and consider whether any additional management measures are required, which may include: - undertake inspection by heritage consultant and WSC - increase monitoring frequency and reporting procedures - repair impacts in consultation with heritage consultant and WSC	As required	IMG
				Report trigger exceedance and actions taken to WSC, IMG, SA NSW & MSO in Status Report	Within one week	Tahmoor Coal

Table 4.1 Risk Control Procedures during the extraction of Tahmoor LW S1A-S7A

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Potable water infrastructure	Impacts to Sydney Water potable water infrastructure	Low to High	None	Follow Sydney Water procedures to monitor and respond to high water pressure levels at water reducing valves	Ongoing	Sydney Water
				Mark out locations of stop valves on site prior to the influence of each longwalls	Prior to active LW face approaching within 150 metres of each water main within predicted limit of incremental subsidence of each active LW.	Sydney Water
				Arrange for reservoirs within the network to be more than 90% capacity during periods of active subsidence of the 450 mm diameter CICL water main	LW S1A: start after 1300m extraction LW S2A: start after 900m extraction LW S3A: start after 500m extraction LW S4A: start after 200m extraction LW S5A: start after 200m extraction LW S6A: start after 200m extraction LW S7A: start after 200m extraction	Sydney Water
				Consider and select options and implement additional risk controls at the creek crossing site for the 450 mm diameter CICL water main (most likely to be installation of expansion joints, subject to ongoing investigations) Selected risk controls - Gibault expansion joints installed at Teatree Hollow crossing at intersection of Remembrance Drive and Caloola Road (Creek 1) - Gibault expansion joints installed at Tributary to Teatree Hollow crossing north of intersection of Remembrance Drive and Yarran Road (Creek 2) - Install Gibault expansion joints at Tributary to Teatree Hollow crossing adjacent to Main Southern Railway at 100.425 km (Creek 3)	Teatree Hollow crossing at intersection of Remembrance Drive and Caloola Road and Tributary to Teatree Hollow crossings north of intersection of Remembrance Drive and Yarran Road (Creek 2) complete Install Gibault joints at Tributary to Teatree Hollow crossing at Main Southern Railway at 100.425 km (Creek 3) prior to start of LW S5A	Tahmoor Coal and Sydney Water
				Consider and select options and implement additional risk controls at the crossing beneath Remembrance Drive and beneath the Main Southern Railway at 100.380 km (most likely to be installation of valve tees and connection points across the rail crossing, subject to ongoing investigations) Selected risk controls at Remembrance Drive road crossing - Gibault expansion joints installed north of Creek 2, which has reduced the potential for impacts on the right angle bend at the southbound (eastern) side of the crossing Selected risk controls at Main Southern Railway crossing - As-built construction investigated, potential Gibault locations identified, sand bedding placed - Installed concrete washout barrier - Construct earth berm - Install Gibault expansion joint north of creek crossing adjacent to Main Southern Railway at 100.425 km (Creek 3)	Remembrance Drive crossing completed Main Southern Railway crossing completed except for planned installation of Gibault joint north of Creek 3, which will be completed prior to start of LW S5A	Tahmoor Coal and Sydney Water
				Continuous monitoring of displacements at Gibault joints	Hourly	Tahmoor Coal (SweetingConsulting)
				Continuous GNSS monitoring as shown in Drawing No. MSEC1193-01-01	GNSS units installed Continuous readings, with data averaged over 24 hours and recorded once per day until end of LW S7A.	Tahmoor Coal (Unit Zero)
				2D survey line along Tahmoor Mine property boundary	Pegs installed. Baseline survey complete Monthly survey during LW S1A between 200m and 1300m extraction, and continue if ongoing adverse movements are observed. End of LW S1A (complete).	Tahmoor Coal (SMEC)
				Conduct 2D / Absolute 3D surveys along Main Southern Railway in accordance with Railway Management Plan	Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone during LWs S1A to S7A	Tahmoor Coal (SRS)
				Conduct 2D / Absolute 3D surveys along Remembrance Drive	Pegs installed from northern boundary of Tahmoor Mine site to Caloola Road. Baseline survey prior to 900m extraction of LW S1A. Extend line and baseline survey pegs within predicted limit of incremental subsidence of each active LW, prior to active LW face approaching within 600 metres of survey line. Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S1A: start after 1300m extraction LW S2A: start after 900m extraction LW S3A: start after 500m extraction LW S4A: start after 200m extraction LW S5A: start after GNSS 28 subsides more than 20 mm due to LW S5A or 200m extraction, whichever occurs first LW S6A: start after GNSS 28 subsides more than 20 mm due to LW S6A or 200m extraction, whichever occurs first LW S7A: start after 200m extraction Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of LW S1A-S7A.	Tahmoor Coal (SMEC)

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Potable water infrastructure	Impacts to Sydney Water potable water infrastructure	Low to High	None	Conduct Local 3D / Absolute 3D survey of Remembrance Drive Embankment over Tributary to Teatree Hollow north of Yarran Road (Creek 2) including water main crossing over Remembrance Drive	Install and baseline survey prior to LW S3A (complete). 3D Survey at end of LW S3A (complete). Monthly 3D / Weekly 2D surveys within active subsidence zone commencing as per below: LW S4A: start after 300m extraction LW S5A: start after 400m extraction LW S6A: start after 400m extraction Continue if ongoing adverse movements are observed. End of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Conduct Local 3D / Absolute 3D survey of Main Southern Railway Embankment over Tributary to Teatree Hollow adjacent to 100.425 km, including water main crossing over Railway	Install and baseline survey prior to LW S3A (complete). 3D Survey at end of LW S3A. Monthly 3D / Weekly 2D surveys within active subsidence zone commencing as per below: LW S4A: start after 200m extraction LW S5A: start after 400m extraction LW S6A: start after 400m extraction Continue if ongoing adverse movements are observed. End of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Conduct 2D surveys along Caloola Road	Pegs installed. Baseline survey prior to 900m extraction of LW S1A.. Survey at end of LW S1A. Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S2A: start after 900m extraction LW S3A: start after 800m extraction LW S4A: start after 800m extraction LW S5A: start after 900m extraction LW S6A: start after 900m extraction Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of LW S2A-S7A.	Tahmoor Coal (SMEC)
				Conduct 2D surveys along Yarran Road	Install and baseline prior to start of LW S3A. Survey at end of LW S3A. Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S4A: start after 200m extraction LW S5A: start after 200m extraction LW S6A: start after 200m extraction LW S7A: start after 200m extraction Continue if ongoing adverse movements are observed. End of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Conduct 2D surveys along Great Southern Road	Install and baseline complete. Survey at end of LW S3A. Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S4A: start after 200m extraction LW S5A: start after 200m extraction LW S6A: start after 200m extraction Continue if ongoing adverse movements are observed. End of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Conduct Local 3D survey of structure and ground marks on the Main Southern Railway Viaduct over the Bargo River as per Drawing No. MSEC1193-03-02, with one mark on the Viaduct to be surveyed in Absolute 3D.	Install and baseline survey complete. Monthly surveys between 1000m and one month after end of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A-S3A (complete).	Tahmoor Coal (SRS)
				Visual inspections by Track Certifier along Main Southern Railway, including Tributary to Teatree Hollow crossing adjacent to Main Southern Railway at 100.425 km (Creek 3) and Main Southern Railway crossing at 100.380 km	Daily within the active subsidence zone during LWs S4A to S6A and continue if ongoing adverse movements or impacts are observed.	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Potable water infrastructure	Impacts to Sydney Water potable water infrastructure	Low to High	None	Visual inspection of Main Southern Railway Viaduct over the Bargo River	Baseline inspection complete Monthly inspections between 1000m and one month after end of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A to S3A (complete)	Tahmoor Coal
				Conduct Local 3D survey of structure and ground marks on the Bargo River Road Bridge over tributary to Bargo River and Bargo River Road Bridge over Main Southern Railway as per Drawing No. MSEC1193-03-03, with one mark on each Bridge to be surveyed in Absolute 3D	Install and baseline complete. Monthly surveys between 1000m and one month after end of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A-S3A (complete).	Tahmoor Coal (SRS)
				Visual inspection of Bargo River Road Bridges	Baseline inspection complete Monthly inspections between 1000m and one month after end of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A to S3A (complete)	Tahmoor Coal
				Detailed visual inspections of local roads, culverts, embankments and cuttings along the routes of the water mains	Weekly for areas within the active subsidence zone during LWs S1A to S7A and continue if ongoing adverse movements or impacts are observed until one month after the extraction of each LW.	Tahmoor Coal (BIS)
				Inform Sydney Water Call Centre of mining in area and possible issues.	Completed	Sydney Water
				Notify residents of potential mine subsidence impacts and contact numbers.	Completed	Tahmoor Coal
				Analyse and report results to IMG, including information on the position of the longwall face.	Weekly during LW S1A-S7A after the length of the extraction exceeds 200 metres.	Tahmoor Coal
			Non-conventional ground movement detected	Notify Sydney Water	Within 24 hours	Tahmoor Coal
				Infrastructure Management Group (IMG) meets to consider whether any additional management measures should be undertaken, including: - increasing the frequency of surveys and visual inspections in vicinity of the non-conventional movement; - investigating for potential of damage occurring to Sydney Water infrastructure; and/or - relieving stresses on the pipes by locally excavating and exposing the pipes in the affected area.	As agreed between Tahmoor Coal and Sydney Water	IMG
			Leakage of water observed	Notify all stakeholders, including Sydney Water, Tahmoor Coal, Subsidence Advisory NSW and Resources Regulator	Within 24 hours	Tahmoor Coal
				Repair leak.	As per Sydney Water procedures (target within 24 hours for 450 mm dia water main)	Sydney Water
				Provide alternative water supply to customers	As required	Tahmoor Coal
				Consider increasing the frequency of surveys and visual inspections in vicinity of water leak, if appropriate.	As agreed between Tahmoor Coal and Sydney Water	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons on public property or, or in vicinity of potable water infrastructure and cannot be controlled	IMG, Tahmoor Coal and Sydney Water meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area	Immediately	Tahmoor Coal and Sydney Water
				Notify SRG of trigger exceedance and any management decisions undertaken (incl Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Potable water infrastructure	Impacts to Sydney Water potable water infrastructure	Low to High	Closure between abutments on Main Southern Rail Viaduct over Bargo River exceeds 7 mm or Closure between GNSS units at ends of Main Southern Rail Viaduct over Bargo River exceeds 7 mm or Closure between abutments Bargo River Road Bridge exceeds 5 mm	Notify Sydney Water	Within one week	MSEC
				Sydney Water and IMG meet and consider whether any additional management measures are required, which may include: - increase monitoring frequency and reporting procedures - install temporary bypass pipeline over creek crossing at Bargo River (Viaduct) or tributary to Bargo River (Bargo River Road Bridge)	Within one week	IMG
				Report trigger exceedance and actions taken to IMG, Sydney Water, SA NSW & MSO in Status Report	Within one week	Tahmoor Coal

Table 4.1 Risk Control Procedures during the extraction of Tahmoor South LW S1A-S7A

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Sewer infrastructure	Impacts to Sydney Water sewer infrastructure	Low	None	Continuous GNSS monitoring as shown in Drawing No. MSEC1193-01-01	GNSS units installed Continuous readings, with data averaged over 24 hours and recorded once per day until end of LW S7A.	Tahmoor Coal (Unit Zero)
				2D survey line along Tahmoor Mine property boundary	Pegs installed. Baseline survey complete. Monthly survey during LW S1A between 200m and 1300m extraction, and continue if ongoing adverse movements are observed (complete). End of LW S1A (complete).	Tahmoor Coal (SMEC)
				Conduct 2D / Absolute 3D surveys along Main Southern Railway in accordance with Railway Management Plan	Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone during LWs S1A to S7A	Tahmoor Coal (SRS)
				Conduct 2D / Absolute 3D surveys along Remembrance Drive	Pegs installed. Baseline survey complete. Extend line and baseline survey pegs within predicted limit of incremental subsidence of each active LW, prior to active LW face approaching within 600 metres of survey line. Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S1A: start after 1300m extraction (complete) LW S2A: start after 900m extraction (complete) LW S3A: start after 500m extraction (complete) LW S4A: start after 200m extraction LW S5A: start after GNSS 28 subsides more than 20 mm due to LW S5A or 200m extraction, whichever occurs first LW S6A: start after GNSS 28 subsides more than 20 mm due to LW S6A or 200m extraction, whichever occurs first LW S7A: start after 200m extraction Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of LW S1A-S7A.	Tahmoor Coal (SMEC)
				Conduct Local 3D / Absolute 3D survey of Remembrance Drive Embankment over Teatree Hollow at Caloola Drive (RE4) as per Drawing No. MSEC1193-03-07.	Install and baseline survey complete. Monthly 3D / Weekly 2D surveys within active subsidence zone commencing as per below: LW S2A: start after 900m extraction LW S3A: start after 800m extraction LW S4A: start after 800m extraction LW S5A: start after 900m extraction Continue if ongoing adverse movements are observed. End of LW S2A-S6A.	Tahmoor Coal (SMEC)
				Conduct Local 3D / Absolute 3D survey of Remembrance Drive Embankment over Tributary to Teatree Hollow north of Yarran Road (RE3) as per Drawing No. MSEC1193-03-08.	Install and baseline survey complete. 3D Survey at end of LW S3A. Monthly 3D / Weekly 2D surveys within active subsidence zone commencing as per below: LW S4A: start after 300m extraction LW S5A: start after 400m extraction LW S6A: start after 400m extraction Continue if ongoing adverse movements are observed. End of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Conduct Local 3D / Absolute 3D survey of Remembrance Drive Embankment over Tributary to Teatree Hollow south of Yarran Road (RE2) as per Drawing No. MSEC1193-03-09.	Install and baseline survey complete. 3D Survey at end of LW S3A. Monthly 3D / Weekly 2D surveys within active subsidence zone commencing as per below: LW S4A: start after 200m extraction LW S5A: start after 200m extraction LW S6A: start after 200m extraction Continue if ongoing adverse movements are observed. End of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Conduct Local 3D / Absolute 3D survey of Remembrance Drive Embankment at intersection of Wellers Road (RE1) as per Drawing No. MSEC1193-03-10.	Install and baseline survey prior to LW S5A. 3D Survey at end of LW S5A. Monthly 3D after 200m extraction of LW S6A until 800m of extraction and continue if ongoing adverse movements are observed. End of LW S6A and S7A.	Tahmoor Coal (SMEC)

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
				Conduct Local 3D / Absolute 3D survey of Remembrance Drive Cutting (RC1) as per Drawing No. MSEC1193-03-11.	Install and baseline survey complete. 3D Survey at end of LW S2A. Monthly 3D / Weekly 2D surveys within active subsidence zone commencing as per below: LW S3A: start after 400m extraction LW S4A: start after 400m extraction LW S5A: start after 500m extraction LW S6A: start after 500m extraction Continue if ongoing adverse movements are observed. End of LW S3A-S7A.	Tahmoor Coal (SMEC)
				Conduct Local 3D survey of structure and ground marks on the Remembrance Drive Bridge over the Bargo River as per Drawing No. MSEC1193-03-02, with one mark on the Bridge to be surveyed in Absolute 3D. The survey includes a measurement of the gap between the deck and the northern abutment.	Install and baseline survey complete. Monthly surveys between 1000m and one month after end of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A-S3A (complete).	Tahmoor Coal (SRS)
				Baseline survey of gaps at expansion joints on sewer main on the Remembrance Drive Bridge over the Bargo River	Baseline survey prior to 400m extraction of LW S1A.	Tahmoor Coal (SRS)
				Visual inspection of Remembrance Drive Bridge over the Bargo River	Baseline inspection complete Monthly inspections between 1000m and one month after end of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A to S3A (complete)	Tahmoor Coal
				Conduct Local 3D survey of structure and ground marks on the Bargo River Road Bridge over tributary to Bargo River and Bargo River Road Bridge over Main Southern Railway as per Drawing No. MSEC1193-03-03, with one mark on each Bridge to be surveyed in Absolute 3D	Install and baseline survey complete. Monthly surveys between 1000m and one month after end of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A-S3A. (complete)	Tahmoor Coal (SRS)
				Visual inspection of Bargo River Road Bridges	Baseline inspection complete Monthly inspections between 1000m and one month after end of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LW S1A to S3A (complete)	Tahmoor Coal
				Detailed visual inspections of local roads, culverts, embankments and cuttings along the route of the sewer main along Remembrance Drive	Weekly for areas within the active subsidence zone during LWs S1A to S6A and continue if ongoing adverse movements or impacts are observed until one month after the extraction of each LW.	Tahmoor Coal
				Detailed visual inspections by geotechnical engineer along Remembrance Drive embankments and cutting	Monthly during periods of active subsidence of LW S2A to S7A, and continue if ongoing adverse movements are observed.	Douglas Partners / PSM
				Inform Sydney Water Call Centre of mining in area and possible issues.	Completed	Sydney Water
				Notify residents of potential mine subsidence impacts and contact numbers.	Completed	Tahmoor Coal
				Analyse and report results to IMG, including information on the position of the longwall face.	Weekly during LW S1A-S7A after the length of the extraction exceeds 200 metres.	Tahmoor Coal
			Non-conventional ground movement detected	Notify Sydney Water	Within 24 hours	Tahmoor Coal
				Notify Sydney Water and convene an IMG meeting. Consider additional monitoring and mitigation measures based on observed monitoring results, which may include: - increase frequency of ground surveys at affected site - increase frequency of visual inspections - excavate to expose pipe and reduce distortion or strain on pipe - increase frequency of IMG meetings - any other additional management actions	As required by IMG	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
			Blockage or leakage of sewage observed	Contact Sydney Water as per contact protocol. Clear blockage as required.	As required by Sydney Water	Sydney Water
				Investigate cause of sewage leak to ascertain whether leak might be due to subsidence	Within 24 hours	Sydney Water
				If blockage is subsidence related, notify all stakeholders, including Sydney Water, Tahmoor Coal, Subsidence Advisory NSW and Resources Regulator	Within 24 hours	Tahmoor Coal
				Convene IMG meeting to consider additional monitoring and mitigation measures based on observed monitoring results, which may include: - increase frequency of surveys along streets - increase frequency of visual inspections - excavate to expose pipe and reduce distortion or strain on pipe - increase frequency of IMG meetings - any other additional management actions	As required by IMG	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons on public property or, or in vicinity of sewer water infrastructure and cannot be controlled	IMG, Tahmoor Coal and Sydney Water meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area	Immediately	Tahmoor Coal and Sydney Water
				Notify IMG of trigger exceedance and any management decisions undertaken (incl Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal
			Closure between abutments on Remembrance Drive Bridge over Bargo River exceeds 7 mm or Closure between abutments Bargo River Road bridges exceeds 5 mm or Impacts observed to bridge	Notify Sydney Water	Within one week	MSEC
				Sydney Water and IMG meet and consider whether any additional management measures are required, which may include: - conduct additional survey of expansion joints on sewer main on Remembrance Drive Bridge over the Bargo River - undertake structural engineering inspection - increase monitoring frequency and reporting procedures - install additional expansion joint on Remembrance Drive Bridge over the Bargo River or Bargo River Road Bridge over tributary to Bargo River - excavate to expose pipe and reduce distortion or strain on pipe on Bargo River Road Bridge over Main Southern Railway - consider potential risks and implement control measures to protect the sewer main if it is decided to conduct modification works on the bridges	Within one week	IMG
				Report trigger exceedance and actions taken to IMG, Sydney Water, SA NSW & MSO in Status Report	Within one week	Tahmoor Coal

Revised Table 4.1: Risk Control Procedures LW S1A-S7A (amended for LW S4A in blue)

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Gas infrastructure	Impacts to Jemena gas infrastructure	Low	None	Excavate and expose 50 metres of gas pipeline along the southbound crest of the Teatree Hollow embankment along Remembrance Drive near the Caloola Road intersection, under supervision from Jemena	Prior to 800m of extraction of LW S3A (complete)	Tahmoor Coal
				Continuous GNSS monitoring as shown in Drawing No. MSEC1193-01-01	GNSS units installed with exception of GNSS on Railway above centreline of LW S5A, which will be installed prior to start of LW S4A Continuous readings, with data averaged over 24 hours and recorded once per day until end of LW S7A.	Tahmoor Coal (Unit Zero)
				2D survey line along Tahmoor Mine property boundary	Pegs installed. Baseline survey complete Monthly survey during LW S1A between 200m and 1300m extraction, and continue if ongoing adverse movements are observed. (complete) End of LW S1A (complete).	Tahmoor Coal (SMEC)
				Conduct 2D / Absolute 3D surveys along Main Southern Railway in accordance with Railway Management Plan	Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone during LWs S1A to S7A	Tahmoor Coal (SRS)
				Conduct 2D / Absolute 3D surveys along Remembrance Drive	Pegs installed from northern boundary of Tahmoor Mine site to No. 3166 Remembrance Drive. Baseline survey complete up to LW S3A. Extend line and baseline survey pegs within predicted limit of incremental subsidence of LWs S4A to LW S7A, prior to start of each LW Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S1A: start after 1300m extraction (complete) LW S2A: start after 900m extraction (complete) LW S3A: start after 500 m extraction LW S4A: start after GNSS at 100.55km subsides more than 20 mm due to LW S4A or ~~300~~200 m extraction, whichever occurs first LW S5A: start after GNSS at 100.55km subsides more than 20 mm due to LW S5A or 200 m extraction, whichever occurs first LW S6A: start after GNSS at 100.55km subsides more than 20 mm due to LW S6A or 200 m extraction, whichever occurs first LW S7A start after 200 m extraction Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of each LW	Tahmoor Coal (SMEC)
				Conduct Local 3D / Absolute 3D survey of Remembrance Drive Embankment over Teatree Hollow at Caloola Drive (RE4) as per Drawing No. MSEC1193-03-07, Remembrance Drive Embankment North of Yarran Road (RE3) as per Drawing No. 1193-03-08, Remembrance Drive Embankment South of Yarran Road (RE2) as per Drawing No. 1193-03-09, and Remembrance Drive Embankment at Wellers Road (RE1) as per Drawing No. MSEC1193-03-10.	Install and baseline survey prior to influence of LWs. Monthly 3D / Weekly 2D surveys within active subsidence zone of each LW Continue if ongoing adverse movements are observed. End of each LW.	Tahmoor Coal (SMEC)
				Conduct Local 3D / Absolute 3D survey of Remembrance Drive Cutting (RC1) as per Drawing No. MSEC1193-03-11.	Install and baseline survey prior to LW S2A. 3D Survey at end of LW S2A. Monthly 3D / Weekly 2D surveys within active subsidence zone commencing as per below: LW S3A: start after 500m extraction LW S4A: start after ~~500~~400m extraction LW S5A: start after 500m extraction LW S6A: start after 500m extraction Continue if ongoing adverse movements are observed. End of LWs S3A to S7A.	Tahmoor Coal (SMEC)
				Conduct Local 3D survey of structure and ground marks on the Remembrance Drive Bridge over the Bargo River as per Drawing No. MSEC1193-03-02, with one mark on the Bridge to be surveyed in Absolute 3D. The survey includes a measurement of the gap between the deck and the northern abutment.	Baseline survey prior to LW S1A. (complete) Monthly surveys between 1000m and one month after end of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LWs S1A to S3A.	Tahmoor Coal (SRS)
				Baseline survey of gaps at expansion joints on sewer main on the Remembrance Drive Bridge over the Bargo River	Baseline survey complete	Tahmoor Coal (SRS)

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
				Visual inspection of Remembrance Drive Bridge over the Bargo River	Baseline inspection prior to LW S1A (complete) Monthly inspections between 1000m and one month after end of extraction of LWs S1A to S3A and continue if ongoing adverse movements are observed. End of LWs S1A to S3A	Tahmoor Coal (BIS)
				Detailed visual inspections of pavement, culverts, embankments and cuttings along the route of the gas main along Remembrance Drive	Weekly for areas within the active subsidence zone or one month after end of LW and continue if ongoing adverse movements or impacts are observed.	Tahmoor Coal ~~(BIS)~~
				Detailed visual inspections by geotechnical engineer for Remembrance Drive embankments and cutting	Monthly for areas within the active subsidence zone during periods of active subsidence of each LW, and continue if ongoing adverse movements are observed.	Douglas Partners
				Inform Sydney Water Call Centre of mining in area and possible issues.	Completed	Sydney Water
				Notify residents of potential mine subsidence impacts and contact numbers.	Completed	Tahmoor Coal
				Analyse and report results to IMG, including information on the position of the longwall face.	Weekly during LW S1A-S7A after the length of the extraction exceeds 200 metres.	Tahmoor Coal
			Ground strain along Remembrance Drive exceeds 2 mm/m or Non-conventional ground movement detected along Remembrance Drive	Notify Jemena	Within 24 hours	Tahmoor Coal
				Notify Jemena and convene an IMG meeting. Consider additional monitoring and mitigation measures based on observed monitoring results, which may include: - increase frequency of ground surveys at affected site - increase frequency of visual inspections - conduct additional gas detection surveys - excavate to expose pipe and reduce distortion or strain on pipe (as per contingency plan) - increase frequency of IMG meetings - any other additional management actions	As required by IMG	Tahmoor Coal
			Leakage of gas observed	Contact Jemena as per contact protocol.	As required by Jemena	Jemena
				Investigate cause of gas leak to ascertain whether leak might be due to subsidence	Within 24 hours	Jemena
				If gas leak is subsidence related, notify all stakeholders, including Jemena, Tahmoor Coal, Wollondilly Shire Council, Sydney Water, Telstra, NBN, Endeavour Energy, neighbouring residents and businesses, Subsidence Advisory NSW and Resources Regulator	Within 24 hours	Tahmoor Coal
				Convene IMG meeting to consider additional monitoring and mitigation measures based on observed monitoring results, which may include: - increase frequency of surveys - increase frequency of visual inspections - conduct additional gas detection surveys - excavate to expose pipe and repair with either temporary clamp or full repair - decide whether to backfill pipe or leave exposed during remaining period of active subsidence - increase frequency of IMG meetings - any other additional management actions	As required by IMG	Tahmoor Coal and Jemena
			A hazard has been identified that involves potential serious injury or illness to a person or persons on public property or, or in vicinity of gas infrastructure and cannot be controlled	IMG, Tahmoor Coal and Jemena meet to decide whether any additional management measures are required, including: - shut off gas main and repair damaged pipe, - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area	Immediately	Tahmoor Coal and Jemena
				Notify stakeholders, including Jemena, Tahmoor Coal, Wollondilly Shire Council, Sydney Water, Telstra, NBN, Endeavour Energy, neighbouring residents and businesses, Subsidence Advisory NSW and Resources Regulator of trigger exceedance and any management decisions undertaken	Within 24 hours of decision	Tahmoor Coal
			Closure between abutments on Remembrance Drive Bridge over	Notify Jemena	Within one week	MSEC

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
			Bargo River exceeds 7 mm or Impacts observed to bridge	Jemena and IMG meet and consider whether any additional management measures are required, which may include: - conduct additional inspection of gas main on Remembrance Drive Bridge over the Bargo River - conduct additional gas detection surveys - undertake structural engineering inspection - increase monitoring frequency and reporting procedures - excavate to expose pipe and reduce distortion or strain on pipe at pipe bend - consider potential risks and implement control measures to protect the gas main if it is decided to conduct modification works on the bridge	Within one week	IMG
				Report trigger exceedance and actions taken to IMG, Jemena, SA NSW & MSO in Status Report	Within one week	Tahmoor Coal

Table 4.1 Risk Control Procedures during the extraction of Tahmoor LW S1A-S7A

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Electrical Infrastructure	Impacts to infrastructure	Low	None	Continuous GNSS monitoring as shown in Drawing No. MSEC1193-01-01	GNSS units installed Continuous readings, with data averaged over 24 hours and recorded once per day until end of LW S7A.	Tahmoor Coal (Unit Zero)
				2D survey line along Tahmoor Mine property boundary	Pegs installed. Baseline survey complete. Monthly survey during LW S1A between 200m and 1300m extraction, and continue if ongoing adverse movements are observed (complete). End of LW S1A (complete).	Tahmoor Coal (SMEC)
				Conduct visual inspections of power poles, conductors, conductor clearances, house connections and local roads within active subsidence zone	Weekly for areas within the active subsidence zone during LWs S1A to S7A and continue if ongoing adverse movements or impacts are observed until one month after the extraction of each LW.	Tahmoor Coal
				Conduct 2D / Absolute 3D surveys along Main Southern Railway in accordance with Railway Management Plan	Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone during LWs S1A to S7A	Tahmoor Coal (SRS)
				Conduct 2D survey along Charlies Point Road	Pegs installed from eastern end survey line to bend at No. 80 Charlies Point Road. Baseline survey prior to start of LW S1A. Extend line and baseline survey to intersection of Great Southern Road prior to start of LW S2A. Monthly survey during LWs S1A-S5A between 200m and 800m extraction, and continue if ongoing adverse movements are observed. End of LW S1A-S7A.	Tahmoor Coal (SMEC)
				Conduct 2D / Absolute 3D surveys along Remembrance Drive	Pegs installed. Baseline survey complete. Extend line and baseline survey pegs within predicted limit of incremental subsidence of each active LW, prior to active LW face approaching within 600 metres of survey line. Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S1A: start after 1300m extraction (complete) LW S2A: start after 900m extraction (complete) LW S3A: start after 500m extraction (complete) LW S4A: start after 200m extraction LW S5A: start after GNSS 28 subsides more than 20 mm due to LW S5A or 200m extraction, whichever occurs first LW S6A: start after GNSS 28 subsides more than 20 mm due to LW S6A or 200m extraction LW S7A: start after 200m extraction Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of LW S1A-S7A.	Tahmoor Coal (SMEC)
				Conduct 2D surveys along Caloola Road	Pegs installed. Baseline survey prior to 900m extraction of LW S1A. Survey at end of LW S1A. Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S2A: start after 900m extraction LW S3A: start after 800m extraction LW S4A: start after 800m extraction LW S5A: start after 900m extraction LW S6A: start after 900m extraction Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of LW S2A-S7A.	Tahmoor Coal (SMEC)

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
				Conduct 2D surveys along Yarran Road	Install and baseline prior to start of LW S3A (complete). Survey at end of LW S3A (complete). Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S4A: start after 200m extraction LW S5A: start after 200m extraction LW S6A: start after 200m extraction LW S7A: start after 200m extraction Continue if ongoing adverse movements are observed. End of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Conduct 2D surveys along Great Southern Road	Install and baseline prior to start of LW S3A (complete). Survey at end of LW S3A (complete). Weekly 2D surveys for pegs within active subsidence zone commencing as per below: LW S4A: start after 200m extraction LW S5A: start after 200m extraction LW S6A: start after 200m extraction Continue if ongoing adverse movements are observed. End of LW S4A-S7A.	Tahmoor Coal (SMEC)
				Conduct pole surveys measuring subsidence at base and vertical offset or tilt of selected critical poles as shown in Table 3.8. * Note: It is noted that some critical poles are located just outside the predicted limit of subsidence for LW S1A-S7A. Tahmoor Coal will these survey poles during the mining of the longwall panel that is closest to them, as if they were in the active subsidence zone (i.e. when each pole is located within a distance of 150 metres in front and 450 metres behind the active longwall face).	Baseline survey of poles identified for by Endeavour Energy for LW S1A-S7A for poles within the predicted limit of incremental subsidence of each active longwall*, prior to active longwall approaching within 600 metres of pole. Monthly for each pole within active subsidence zone and for following three months after leaving active subsidence zone* End of LW S1A-S7A for all poles within predicted limit of incremental subsidence of each active longwall*.	Tahmoor Coal (SMEC)
				Analyse and report results to IMG, including information on the position of the longwall face.	Weekly during LW S1A-S7A after the length of the extraction exceeds 200 metres.	Tahmoor Coal
			Impacts observed to power poles, buried cables or conductor clearance heights	Notify all stakeholders, including Endeavour Energy, Tahmoor Coal, Subsidence Advisory NSW and Resources Regulator	Within 24 hours	Tahmoor Coal
				Repair impact.	As per Endeavour Energy procedures	Endeavour Energy
				Infrastructure Management Group (IMG) meets to consider whether any additional management measures should be undertaken, including: - increasing the frequency of surveys and visual inspections in vicinity of impact site; - investigating for potential of damage occurring to nearby Endeavour Energy infrastructure.	As agreed between Tahmoor Coal and Endeavour Energy	IMG
Electrical Infrastructure	Impacts to infrastructure	Low	A hazard has been identified that involves potential serious injury or illness to a person or persons on public property or, or in vicinity of electrical infrastructure and cannot be controlled	IMG, Tahmoor Coal and Endeavour Energy meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area	Immediately	Tahmoor Coal and Endeavour Energy
				Notify IMG of trigger exceedance and any management decisions undertaken (incl Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal

Table 5.1 Risk Control Procedures for Telecommunications Infrastructure during the Extraction of LW S3A-S7A (TARP)

Item of Plant	RISK	Trigger	Control Procedures	Timing and Frequency	By Whom
1. Telstra Local cable a) Conduit & Pit Network b) Aerial Cable Network	Low Moderate	Ground Strain > 1.5mm/m and/or anomalous ground movement reported.	Survey Lines along Remembrance Drive, Caloola and Yarran Roads. Visual inspection of aerial cable network with focus on pole tilt and cable tension/sag - report other (non-subsidence) infrastructure damage to asset owner. If triggered complete specific visual inspection refer to IMG.	Baseline prior to LW start. Weekly during active subsidence. Weekly during active subsidence Within 48hrs	SMEC/TC TC TC/IMG
2. Main Copper Network. a) Plastic Sheath Cable b) Lead Sheathed Cable	Low	Ground Strain > 1.5mm/m and/or anomalous ground movement reported.	Survey Lines along Remembrance Drive. Visual inspection of pit top only - report other (non-subsidence) infrastructure damage to asset owner. If triggered complete specific visual inspection based on survey results. Refer to IMG.	Baseline prior to LW start. Weekly during active subsidence. Monthly during active subsidence. Within 48hrs	SMEC/TC TC TC/IMG
3. Telstra direct buried IEN/CAN optical fibre cable (F BRGO 101 12f)	Medium	OTDR loss on fibre <0.3dB and/or ground strain >1.5mm/m or anomalous movement.	Baseline local street surveys along Remembrance Drive and the rail corridor. Visual inspection if triggered - report other (non-subsidence) infrastructure damage to asset owner. Routine real time monitoring of optic fibre performance by Telstra (including triggers in-house technical meetings) If triggered refer to IMG (consider uncoupling), visual inspection, report other (non-subsidence) infrastructure damage to asset owner.	Baseline prior to LW start. Weekly during active subsidence. Weekly Within 48hrs	SMEC/TC Telstra TC/IMG
4. Conduit, Manhole and Pit Network	Low	If survey details show anomalous movement check cables in conduit network.	Survey Lines along Remembrance Drive, Caloola and Yarran Roads. Visual inspection of conduit routes pits and manholes in Remembrance Drive, Caloola Road and Yarran Road whilst in area of active - report other (non-subsidence) infrastructure damage to asset owner. If triggered refer to IMG.	Baseline prior to LW start. Weekly during active subsidence. If triggered only. Within 48hrs	SMEC TC TC/IMG
5. NBN Tower	Medium	Tip rotation exceeds 1° (excluding wind effects)	Baseline local street surveys along Remembrance Drive, Yarran Road and power cable alignment. Weekly visual inspections of power cable route and tower - report other (non-subsidence) infrastructure damage to asset owner. Routine real time monitoring tilt monitoring of tower structure If triggered refer to IMG.	Baseline prior to LW start. Weekly during active subsidence. 24hrs/day Within 48hrs	SMEC TC Sweeting Consulting TC/IMG

Table 6.1 Risk control procedures for built structures for LWs S1A-S7A

Infrastructure	Hazard / impact	Risk	Trigger	Control procedure/s	Timing and frequency	By whom?
Items of heritage significance, public amenities, commercial, business and industrial establishments predicted to experience more than 20 mm of subsidence due to the extraction of LWs S1A-S7A				Refer separate Property Subsidence Management Plans		
Residential structures that will experience mine subsidence effects due to the mining of LWs S1A-S7A	Impacts occur	Low to Moderate	Prior to mining	Community consultation, including letters to landowners offering a Pre-Mining Inspection and Hazard Identification inspection for structures predicted to experience more than 20 mm of subsidence due to the extraction of LWs S1A-S7A.	Complete	Tahmoor Coal
				Front of house screening inspection to identify any potentially unstable structures, for structures predicted to experience more than 20 mm of subsidence due to the extraction of LWs S1A-S7A.	Complete	Tahmoor Coal
				Conduct pre-mining hazard identification inspection and assessment by geotechnical engineer of structures on or near steep slopes to check whether there is any potential for slope instability prior to, during or after mining, for structures predicted to experience more than 20 mm of subsidence due to the extraction of LWs S1A--S7A.	No structures located on or near natural steep slopes within Study Area	-
				Conduct pre-mining hazard identification inspection and assessment by structural engineer, including: • structures requested for inspection by landowner during community consultation • structures directly above LWs S1A-S7A in semi-rural / rural areas remote from street front, where front of house screening is not practicable • structures that have been recommended for structural inspection by the geotechnical engineer • structures that have been recommended for structural inspection during front of house screening inspections • structures built prior to declaration of the Bargo Mine Subsidence District (1975) that are predicted to experience more than 150 mm of subsidence due to the extraction of LWs S1A-S7A • structures above potential hidden creeks that are predicted to experience more than 20 mm of subsidence due to the extraction of LWs S1A-S7A • structures above mapped geological structures that are predicted to experience more than 20 mm of subsidence due to the extraction of LWs S1A-S7A	Complete for LWs S1A-S3A All but one complete for LW S4A Complete remainder prior to active LW face approaching within 300 m of each property	Tahmoor Coal
				Installation of additional monitoring measures or mitigation/strengthening measures as recommended by structural engineer.	Prior to active LW face approaching within 100 m of each property	Tahmoor Coal
				Install ground monitoring lines on streets above LWs S1A-S7A and baseline survey initial levels and strain distances (as shown in Drawing No. MSEC1193-01-01).	Complete Complete within predicted limit of incremental subsidence of each active LW, prior to active LW face approaching within 600 metres of survey line.	Tahmoor Coal (SMEC)
				Install ground pegs for structures as requested by or agreed with landowners	Complete prior to active LW face approaching within 400 m of each property	Tahmoor Coal (SMEC)
				Confirm arrangements for building contractors to remain on standby for immediate call out and service in the event of impacts affecting safety or serviceability.	Complete	Tahmoor Coal
			Discovery of potential structural issue prior to mining	Conduct structural hazard identification inspection and assessment and consider: - any mitigation / strengthening measures to improve the existing structural condition - any management measures that should be undertaken prior to or during mining - any monitoring and inspection measures, triggers and responses during mining	Within 1 week of discovery	Tahmoor Coal
				Advise property owner, Subsidence Advisory NSW and Resources Regulator of findings of structural engineer.	Prior to active LW face approaching within 300 m of each property	Tahmoor Coal
				Undertake mitigation / strengthening measures if decided by SRG.	Prior to active LW face approaching to within 100 m of structure	Tahmoor Coal

Infrastructure	Hazard / impact	Risk	Trigger	Control procedure/s	Timing and frequency	By whom?
Residential structures that will experience mine subsidence effects due to the mining of LWs S1A-S7A	Impacts occur	Low to Moderate	During the mining of LWs S1A-S7A	Surveys of street survey lines within active subsidence area, including Charlies Point Road, Remembrance Drive, Caloola Road, Yarran Road and the Great Southern Road	Weekly for pegs located within active subsidence zone after the length of the extraction exceeds 200 metres (except monthly for pegs along Charlies Point Road)	Tahmoor Coal (SMEC)
				Conduct kerbside visual inspection of streets and structures	Detailed inspection once a week Vehicle based inspection once a week within active subsidence area	Tahmoor Coal
				Conduct inspections during mining for following structures (where access is granted): a) Structures that have previously experienced mine subsidence impacts, where recommended by the SRG b) Pool gates and fences c) Any other structures recommended for regular inspections and/or structure surveys by geotechnical or structural engineer following pre-mining hazard identification inspection and assessment	Weekly within active subsidence zone after the length of the extraction exceeds 200 metres, or as required by geotechnical or structural engineer	Tahmoor Coal
				Conduct ground surveys for structures as requested by or agreed with landowners	One survey per longwall when house is within active subsidence zone, targeted to occur when LW face has passed house between 100 and 200 metres.	Tahmoor Coal (SMEC)
				Analyse and report results of monitoring and inspections to SRG	Weekly during LWs S1A-S7A after the length of the extraction of each LW exceeds 200 metres.	Tahmoor Coal (MSEC)
				SRG discuss results and consider whether any additional management measures are required	Weekly during LWs S1A-S7A after the length of the extraction of each LW exceeds 200 metres.	SRG
			Observed tilts are greater than 7 mm/m or observed curvatures are greater than 0.2 km^{-1} near structure	Conduct inspection of building and provide photographic survey and impact report	Within one week	Tahmoor Coal
				Consider structural inspection/additional monitoring and/or mitigation/strengthening measures	Immediately after building inspection	Tahmoor Coal
			Significant non-conventional movement occurs or Impacts observed to any surface infrastructure (not just structures) or Slope slippage observed	Consider whether any additional management measures are required in light of observations, including additional geotechnical or structural inspections, increase frequency of surveys and inspections, additional community consultation	As required by SRG	SRG
				Notify landowner, Tahmoor Coal, Subsidence Advisory NSW and MSO	Within one week	Tahmoor Coal

Infrastructure	Hazard / Impact	Risk	Trigger	Control procedure/s	Timing and frequency	By whom?
Residential establishments that will experience mine subsidence movements due to the mining of LW S1A-S7A	Impacts occur	Low to Moderate	Any impact occurs to structure	As information can come from many possible sources: If not already done, notify landowner, Tahmoor Coal, Subsidence Advisory NSW	Within 24 hours	Tahmoor Coal
				Inspect impact of subsidence on building	As soon as possible	Tahmoor Coal
				Inspect condition of building by structural engineer, where recommended by the SRG based on feedback from Subsidence Advisory NSW	As recommended by SRG with active subsidence area or as agreed with owner	Tahmoor Coal
				Rectify any adverse impacts that impair upon: - the safety, access and mobility, security or fire egress - any essential services - sensitive equipment	As soon as possible at any stage during mining	Tahmoor Coal
				Repair damage to structure	When subsidence impacts cease	Tahmoor Coal
			Observed impacts meet the criteria under Condition C15 of the Project Approval (refer Section 1.9)	Offer landowner the option to acquire property in accordance with the *Coal Mine Subsidence Compensation Act 2017*.	As soon as possible	Tahmoor Coal
			Observed impacts are greater than predicted impacts	Investigate cause(s) for greater impacts, including possibility of non-conventional or anomalous movements, type of structure. Investigate spatial trends in data to identify any pattern.	Within one week of observation	Tahmoor Coal
			Structure has become or is likely to be become hazardous as a result of subsidence	Notify landowner, Tahmoor Coal, Subsidence Advisory NSW and Resources Regulator	Within 24 hours	Tahmoor Coal
				Inspect structural condition of building.	Within two days and then as recommended by structural engineer	Tahmoor Coal
				Reassess final level of damage based upon likelihood of further damage and structural condition.	Immediately after structural re-inspection.	SRG
				Consider additional monitoring and/or mitigation/strengthening measures	Immediately after structural re-inspection.	SRG
			A hazard has been identified that involves potential serious injury or illness to a person or persons at the property, and cannot be controlled	Provide temporary accommodation for residents in coordinate with Subsidence Advisory NSW	Immediately	Tahmoor Coal
				Notify MSO	Within 24 hours	Tahmoor Coal
				Offer landowner the option to acquire property in accordance with the *Coal Mine Subsidence Compensation Act 2017*.	Immediately	Tahmoor Coal
			Property owner does not accept acquisition	Temporarily relocate residents until building is repaired	Immediately	Tahmoor Coal
Houses	House subsides below 1% AEP flood level	Moderate	Prior to Mining	Conduct flood study to assess potential for floor levels of houses near Teatree Hollow at intersection of Caloola Road and Remembrance Drive to fall below 1% AEP flood level due to mine subsidence	Complete	Tahmoor Coal
				Conduct pre-subsidence survey of surface topography and floor levels of houses near predicted 1% AEP flood level.	LiDAR survey complete Floor level surveys prior to 800m extraction of LW S1A	Tahmoor Coal (SMEC)
			During Mining	Ensure culverts along Teatree Hollow at Remembrance Drive and Main Southern Railway are clear of debris	Ongoing	Tahmoor Coal
			Completion of Mining	Conduct post-mining survey of surface topography and floor levels of houses	End of LW S7A	Tahmoor Coal (SMEC)
				Conduct post-mining flood study to assess whether any houses has subsided below 1% AEP flood level	End of LW S7A	Tahmoor Coal
			House(s) subside below 1% AEP flood level	Raise house(s) or upgrade drainage structures so that floor level(s) are above 1% AEP flood level	As required	Tahmoor Coal
Houses	Impacts to future houses	Low to Moderate	Prior to mining each LW	Contact residents to inform them of commencement of mine subsidence. Request owners for information on whether any new houses have been constructed in the last year.	Prior to subsidence occurring	Tahmoor Coal
			Owner notifies of new house	Conduct subsidence predictions, impact assessment and pre-mining hazard identification inspection, if access provided by landowner	Prior to subsidence occurring	Tahmoor Coal
				Follow risk control procedures, as for other houses	Immediately	Tahmoor Coal (MSEC)

Infrastructure	Hazard / impact	Risk	Trigger	Control procedure/s	Timing and frequency	By whom?
Swimming pools and pool gates	Damage to pool	Low	None	Notify owner of potential impacts to pool	Before mine subsidence impacts occur	Tahmoor Coal
	Pool gate – won't shut	High	None	Notify owner of potential impact to pool gate and fence	Before mine subsidence impacts occur	Tahmoor Coal
				Visually inspect pool gate to check that it is operating properly	Weekly when each pool is within active subsidence zone, and at completion of each longwall	Tahmoor Coal
			Pool gate won't close	Notify resident and/or landowner, contact Subsidence Advisory NSW to repair gate	Immediately	Tahmoor Coal
				Repair gate	As soon as possible	Tahmoor Coal
Farm dams	Loss of water storage due to leakage of dam wall or floor	Low	During mining	Visual inspection of dam by geotechnical engineer, including recording of water levels	Monthly during period of active subsidence at each dam for each LW Quarterly for minimum of 12 months after completion of LW S7A	Tahmoor Coal
			Cracks > 10mm wide observed in dam wall (i.e. other than natural desiccation cracking) AND/OR Isolated seepage without suspended solids (e.g. clear water) from the face or toe of the farm dam embankment	Notify SRG	Within 24 hours	Tahmoor Coal
				Conduct geotechnical inspection of dam to assess cause and determine need for further action / investigation	Within 48 hours	Tahmoor Coal
				SRG meet and review latest monitoring information for the dam, inspections by geotechnical engineer and building inspector, and latest weather forecasts. SRG consider whether any additional management measures are required, which may include: - backfill cracks and/or regrade drainage line - increase monitoring frequency and reporting procedures - arrange additional monitoring locations to monitor potential displacement of dam wall material - lower water level of dam (if relevant) - consider potential consequence of dam break and whether any other management measures are required.	Within 24 hours of geotechnical inspection	SRG
				Notify landowner, Tahmoor Coal, Subsidence Advisory NSW and Resources Regulator	Within 24 hours	Tahmoor Coal
			Persistent longitudinal or arcuate cracking > 20 mm wide observed within dam wall AND Seepage with suspended solids (e.g. turbid water) from the face or toe of the farm dam embankment	Notify SRG	Within 24 hours	Tahmoor Coal
				Conduct geotechnical inspection of dam to assess cause and determine need for further action / investigation	Within 24 hours	Tahmoor Coal
				SRG meet and review latest monitoring information for the dam, inspections by geotechnical engineer and building inspector, and latest weather forecasts. SRG consider whether any additional management measures are required, which may include: - backfill cracks and/or regrade drainage line - increase monitoring frequency and reporting procedures - arrange additional monitoring locations to monitor potential displacement of dam wall material - lower water level of dam (if relevant) - consider potential consequence of dam break and whether any other management measures are required.	Within 24 hours of geotechnical inspection	SRG
				Notify landowner, Tahmoor Coal, Subsidence Advisory NSW and Resources Regulator	Within 24 hours	Tahmoor Coal
			Loss of water supply due to leakage of dam wall or floor	Supply water to landowner	As required	Tahmoor Coal

Table 4.1 Risk Control Procedures during the extraction of Tahmoor LW S1A-S6A

RISK ISSUE	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
IMPACTS ON BUILDINGS, WALLS, PAVEMENTS, FENCES, GATES AND DAM	None	Undertake structural inspections and assessments before subsidence	Complete	Tahmoor Coal (JMA)
		Conduct 2D / Absolute 3D surveys along Remembrance Drive	Baseline survey complete. Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone: Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of LW S1A-S6A.	Tahmoor Coal (SMEC)
		Local 3D survey around perimeter of buildings during active subsidence as per Drawing No. MSEC1193-11-02	Pegs installed and baseline survey completed Surveys if triggered by ground surveys and/or visual inspections. End of LW S1A-S4A.	Tahmoor Coal (SMEC)
		2D survey along four monitoring lines between College buildings during active subsidence, as per Drawing No. MSEC1193-11-02	Pegs installed and baseline survey completed Weekly surveys during active subsidence zone as per below: LWs S1A and S2A: after 1500m extraction until one month after end of LW Continue surveys if ongoing adverse movements are observed. End of LW S1A-S4A.	Tahmoor Coal (SMEC)
		Local 3D survey around perimeter of Clifford Warne Auditorium during active subsidence	Pegs installed and baseline survey completed Weekly surveys during active subsidence zone as per below: LWs S1A and S2A: after 1500m extraction until one month after end of LW Continue surveys if ongoing adverse movements are observed. End of LW S1A-S4A.	Tahmoor Coal (SMEC)
		Visually inspect Wollondilly Anglican College by building inspector, including buildings, wall, handrails, pavements, footbridge, fences, gates and the dam and focussed inspections as recommended by structural engineer JMA Solutions in Table 3.4 of this Management Plan.	Weekly inspection during active subsidence zone as per below: LWs S1A and S2A: after 1500m extraction until one month after end of LW Continue inspections if ongoing adverse movements are observed. End of LW S1A-S4A.	Tahmoor Coal (BIS)
		Visually inspect dam by geotechnical engineer (the dam is planned to decommissioned by Wollondilly Anglican College in early 2024)	Weekly inspection during active subsidence zone whilst dam is in operation as per below: LWs S1A and S2A: after 1500m extraction until one month after end of LW Continue inspections if ongoing adverse movements are observed. End of LW S1A-S4A.	Tahmoor Coal (Douglas Partners)
		Maintenance inspection of the lift	Pre-mining inspection complete Maintain as per standard Wollondilly Anglican College procedures End of LW S2A	Wollondilly Anglican College (The Lift Shop)
		Alignment surveys of sensitive school equipment as required by Wollondilly Anglican College	Baseline survey prior 1100m extraction of LW S1A Additional surveys if triggered by ground surveys and/or visual inspections.	Tahmoor Coal (SweetingConsulting)
		Report findings of surveys and inspections to SRG, Wollondilly Anglican College, Subsidence Advisory NSW, Resources Regulator	LWs S1A and S2A: after 1500m extraction until one month after end of LW Continue reporting if ongoing adverse movements are observed End of LW S1A-S4A.	Tahmoor Coal (MSEC)
		Review and assess monitoring report and consider whether any additional management measures are required	LWs S1A and S2A: after 1500m extraction until one month after end of LW Continue reviews if ongoing adverse movements are observed End of LW S1A-S4A.	SRG

RISK ISSUE	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
IMPACTS ON BUILDINGS, WALLS, PAVEMENTS, FENCES, GATES AND DAM (continued)	Non-conventional movements identified from weekly surveys or Visual inspections identify impacts to building	SRG meet and consider whether any additional management measures are required, including: - structural inspection - additional survey around building(s) - increase monitoring and reporting procedures - repair impacts	Within 1 week or as required	SRG
		Notify SRG of trigger exceedence and any management decisions undertaken (incl Wollondilly Anglican College, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
	A hazard has been identified that involves potential serious injury or illness to a person or persons on public property, or Wollondilly Anglican College property and cannot be controlled	SRG, Tahmoor Coal and Wollondilly Anglican College meet to decide whether any additional management measures are required, including: - suspension of work activities within the hazardous area - demarcation of workplace to restrict people from entering or working in hazardous area - emergency evacuation of workplace - decide whether to continue LW operation in current LW panel or relocate LW equipment to next LW panel	Immediately	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl Wollondilly Anglican College, Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal
IMPACTS ON FIRE PROTECTION SERVICES, SECURITY SERVICES, ESSENTIAL SERVICES, ACCESS AND MOBILITY, FINISHES, AND PUBLIC SAFETY HAZARDS	None	Follow procedures above	-	-
	Impacts observed	Repair impacts	Immediately as required by Wollondilly Anglican College to avoid interruption to operations (target within 24 hours if required)	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl Wollondilly Anglican College, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
IMPACTS ON FOOTBRIDGE	None	Follow procedures above	-	-
	Closure between footbridge abutments exceeds 10 mm or Expansion gaps between footbridge deck and abutments are closed or Visual inspections identify impacts to footbridge	SRG meet and consider whether any additional management measures are required, including: - structural inspection - increase monitoring and reporting procedures - cut additional gap between deck and abutments - repair impacts	Within 1 week or earlier if required	SRG
		Notify SRG of trigger exceedence and any management decisions undertaken (incl Wollondilly Anglican College, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
IMPACTS ON MANUFACTURING TRAINING EQUIPMENT	None	Follow procedures above	-	-
	Non-conventional movements identified from weekly surveys near Bradfield College or Visual inspections identify impacts to Bradfield College or Wollondilly Anglican College observed misalignment to equipment	SRG meet and consider whether any additional management measures are required, including: - Additional alignment survey - increase monitoring and reporting procedures - relevel equipment	Within 1 week or earlier if required	SRG
		Notify SRG of trigger exceedence and any management decisions undertaken (incl Wollondilly Anglican College, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal

RISK ISSUE	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
IMPACTS ON PASSENGER LIFT	None	Follow procedures above	-	-
	Non-conventional movements identified from weekly surveys near Cuthbert College or Visual inspections identify impacts to Cuthbert College or lift	SRG meet and consider whether any additional management measures are required, including: - structural inspection - additional maintenance inspection of lift - increase monitoring and reporting procedures - repair impacts	Within 1 week or earlier if required	SRG
		Notify SRG of trigger exceedence and any management decisions undertaken (incl Wollondilly Anglican College, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
IMPACTS ON STORAGE AND MATERIALS HANDLING	None	Follow procedures above	-	-
	Substantial tilt of storage shelves observed	SRG meet and consider whether any additional management measures are required, including: - relevel storage shelves - provide additional support to shelving	As required by Wollondilly Anglican College to avoid interruption to operations (target within 24 hours if required)	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl Wollondilly Anglican College, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
IMPACTS ON DAM	None	Follow procedures above	-	-
	Cracks observed in dam wall > 10 mm wide (other than natural desiccation cracking) or Seepage observed in dam wall	SRG meet and consider whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - place material at the toe of the embankment - temporarily lower or dewater dam or repair the dam wall - brief Wollondilly Anglican College staff and students to restrict access downstream of dam	As required (target within 48 hours)	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl Wollondilly Anglican College, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
	A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	SRG, Tahmoor Coal and Wollondilly Anglican College meet to decide whether any additional management measures are required, including: - suspension of work activities within the hazardous area - demarcation of workplace to restrict people from entering or working in hazardous area - emergency evacuation of workplace - dewater	Immediately	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl Wollondilly Anglican College, Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal

Table 5.2 Risk Control Procedures during the extraction of Tahmoor LW S1A-S6A

TRIGGER	CONTROL PROCEDURES	TIMING & FREQ	BY WHOM?
General Procedures			
ABBREVIATIONS WITHIN THESE TABLES: ARTC = Australian Rail Track Corporation MSO = NSW Department of Planning & Environment, Resources Regulator, Mine Safety Operations SRS = Southern Rail Surveys (ground surveys within rail corridor) MSEC = Mine Subsidence Engineering Consultants IMG = Infrastructure Management Group RMC = Rail Maintenance Contractor, Bloor Rail JMA = JMA Solutions (structural engineer) SMEC = SMEC (ground surveys beyond rail corridor) BIS = Building Inspection Services TC = Tahmoor Coal	**None**	**EARLY WARNING MONITORING**		
	Continuous GNSS monitoring for S1 to S15 as shown in Drawing No. MSEC1201-03	GNSS units S1 to S15 installed Continuous readings, with data averaged over 24 hours and recorded once per day	Tahmoor Coal (Unit Zero)
	2D survey line along Tahmoor Mine property boundary and alongside (V Line)	Pegs installed. Baseline survey prior to commencement of LW S1A. Monthly survey during LW S1A between 200m and 1300m extraction, and continue if ongoing adverse movements are observed. End of LW S1A.	Tahmoor Coal (SMEC)
	GENERAL MINE SITE MONITORING		
	Continuous GNSS monitoring at unit S16 near the site survey datum and Shaft No. 3 Continuous GNSS monitoring at unit “Gantry” on top of Pier 2	GNSS unit S16 and Gantry installed Continuous readings, with data averaged over 24 hours and recorded once per day	Tahmoor Coal (Unit Zero)
	Conduct 2D / Absolute 3D surveys along Main Southern Railway in accordance with Railway Management Plan	Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone	Tahmoor Coal (SRS)
	Conduct 2D / Absolute 3D surveys along Rail Loop	Pegs installed. Baseline survey completed. Monthly 3D / Weekly 2D surveys LW S1A and LW S2A: Monthly after 1100m, weekly after 1300m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SRS)
	Conduct 2D / Absolute 3D surveys along Remembrance Drive in accordance with Wollondilly Shire Council Management Plan	Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone	Tahmoor Coal (SMEC)
	Visual inspections of mine site, including Stockpile Area, overhead conveyors, underground conveyors, building structures, pavements, dams (subsidence inspection in addition to routine inspections by Tahmoor Mine as part of routine operations)	Weekly within the active subsidence zone until one month after end of LW, and continue if ongoing adverse movements are observed	Tahmoor Coal / BIS
	OTHER MEASURES		
	Standard Tahmoor Coal maintenance, monitoring and risk control procedures, including inspections and condition monitoring	As per TC operations and maintenance management system	Tahmoor Coal
	Brief and train workers at Tahmoor Mine Site	Complete	Tahmoor Coal
	Analyse and report results to IMG	LW S1A and LW S2A: Weekly after 1000m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (MSEC)
	IMG discuss results and consider whether any additional management measures are required	LW S1A and LW S2A: Monthly after 1000m, weekly after 1300m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (MSEC)

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Stockpile Area (Conveyors 5C and Reclaim Tunnel Conveyor 6C)	Conveyor 5C: Stress build-up in trestle legs and at bolted connections to gallery Stress in superstructure, particularly T4 to Pier 2 Change in alignment of 5C conveyor and tripper rails Loss of serviceability Reclaim Tunnel Conveyor 6C: Cracking of tunnel structure at isolated locations Change in alignment of 6C conveyor Loss of serviceability and egress	Medium	None	Follow general procedures	-	-
				Conduct structural assessment of Overhead Conveyor 5C and Reclaim Tunnel structure	Complete	JMA
				Temporarily remove Pedestrian Gantry during active subsidence	Prior to 1200m of LW S1A (planned Feb 2023)	Tahmoor Coal
				Strengthen Pier 1 connection	Complete	Tahmoor Coal
				Upgrade expansion joint at T4 and modify services, walkway, tripper rail across expansion joint	Complete	Tahmoor Coal
				Design and Install new sliding bearing at Pier 2 connection	Complete	Tahmoor Coal
				Cut movement joint in Reclaim Tunnel between T6 and Pier 2 and modify services across joint to accommodate movement	Complete	Tahmoor Coal
				Install Tripper rail expansion joint with removable inserts	Complete	Tahmoor Coal
				Check conveyor and tripper rail alignment and correct to within operating tolerances (if required)	Complete	Tahmoor Coal
				Continuous Wander tracking switches (existing)	Operate continuously Conveyor 5C: Prior to 1200m of LW S1A Conveyor 6C complete	Tahmoor Coal
				Dozer proximity alarm to Trestle legs (existing)	Operate continuously	Tahmoor Coal
				Fixed CCTV camera	Operate continuously	Tahmoor Coal
				Relative 3D surveys along Reclaim Tunnel (Conveyor 6C)	Baseline survey prior to 900m of LW S1A LW S1A and LW S2A: Weekly after 1200m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Relative 3D surveys along tops of trestles and concrete piers (Conveyor 5C)	Baseline survey prior to 900m of LW S1A LW S1A and LW S2A: Weekly after 1200m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Stockpile inclinometers 1 and 2	Installed and baseline surveyed LW S1A and LW S2A: Weekly after 1200m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal
				Continuous tilt monitoring at Gantry GNSS unit on top of Pier 2	Installed Continuous readings, with data averaged over 24 hours and recorded once per day	Tahmoor Coal (Unit Zero)
				Continuous expansion joint monitoring by displacement sensor and tilt monitoring at Trestle T4	Installed Continuous readings, with data averaged over 24 hours and recorded once per day	Tahmoor Coal (SweetingConsulting)
				Measure gap in tripper rail at expansion joint	LW S1A and LW S2A: Weekly after 1200m until one month after end of LW, and continue if ongoing adverse movements are observed	Tahmoor Coal
				Continuous stress monitoring at Trestle T4	Installed Continuous readings, with data averaged over 24 hours and recorded once per day	Tahmoor Coal (SweetingConsulting)
				Joint monitoring across movement joint in Reclaim Tunnel between Trestle T6 and Pier 2	Baseline survey prior to 900m of LW S1A LW S1A and LW S2A: Weekly after 1200m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SMEC)

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Stockpile Area (Conveyors 5C and Reclaim Tunnel Conveyor 6C) (continued)	Conveyor 5C: Stress build-up in trestle legs and at bolted connections to gallery Stress in superstructure, particularly T4 to Pier 2 Change in alignment of 5C conveyor and tripper rails Loss of serviceability Reclaim Tunnel Conveyor 6C: Cracking of tunnel structure at isolated locations Change in alignment of 6C conveyor Loss of serviceability and egress	Medium	A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - If Conveyor 5C is unserviceable: use Pier 1 Clam Gate and push coal in stockpile until repairs can be completed (may require second Dozer) - If Reclaim Tunnel and Conveyor 6C are unserviceable: Coal to be loaded out of the stock pile via front end loader operation to load trains and/or develop temporary loading facility at base of Conveyor 7C	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal
			Displacement sensor at T4 opens or closes more than 30 mm and/or Longitudinal strain within Reclaim Tunnel exceeds 1 mm/m (tensile or compressive) between adjacent prisms and/or Damage observed from visual inspections	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - Adjust rail tripper expansion joint - Adjust sliding bearing at Pier 2 - Adjust connection at Pier 1 - Restrict stockpile operations (staged) - Provide additional structural support to Conveyor 5C (props) - Adjust conveyor alignment - Adjust tripper rail alignment - Repair services - Isolate and Repair with the use of the clam gate - Repair cracks to concrete lining - Provide additional structure support to roof and walls to maintain access and second egress - Restrict stockpile operations to reduce load on tunnel - Excavate and expose tunnel lining and strengthen tunnel externally, repair chutes	As required (target within 48 hours)	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Overhead conveyors (other than Conveyor 5C) and Reclaim Tunnel Conveyor 4F	Overhead conveyors: Stress build-up in trestle legs and at bolted connections Stress in superstructure Change in alignment of conveyor Loss of serviceability Reclaim Tunnel Conveyor 4F: Cracking of tunnel structure at isolated locations Change in alignment of 4F conveyor Loss of serviceability and egress	Low	None	Follow general procedures	-	-
				Conduct structural assessment of overhead conveyors	Complete	JMA
				Check conveyor alignment and correct to within operating tolerances for Conveyors 3R, 4C, 4S, 6C, 7C and 8C (if required)	Complete	Tahmoor Coal
				Local 3D survey along tops and bases of conveyor trestles	Baseline survey prior to 1000m of LW S1A LW S1A and LW S2A: Weekly after 1300m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Laser distancemeter across MSR at Conveyor 3R	Installed Continuous readings, with data averaged over 24 hours and recorded once per day	Tahmoor Coal (SweetingConsulting)
				Extensometer monitoring across base of four-legged trestle at Conveyor 3R	Baseline survey complete End of LW S1A-S3A	Tahmoor Coal (SRS)
				Local 3D survey along Reclaim Tunnel 4F	Baseline survey prior to 900m of LW S1A End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Stockpile inclinometer 2	Installed and baseline surveyed LW S1A and LW S2A: Weekly after 1300m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal
				Continuous Wander tracking switches (existing)	Operate continuously	Tahmoor Coal
			Opening or Closure between adjacent trestles exceeds 10 mm and/or Damage observed from visual inspections	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				Notify ARTC if the trigger was exceeded where Conveyor 3R crosses the Main Southern Railway	Within one week	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - Adjust hold down bolts and install shims to underside of baseplates - Place concrete block adjacent to trestle bases - Provide additional structural support to trestles (props) - Adjust conveyor alignment - Repair services - Install fencing to prevent access of site staff beneath affected section of conveyor - Repair cracks to concrete lining - Provide additional structure support to roof and walls to maintain access and second egress - Restrict stockpile operations to reduce load on tunnel - Excavate and expose tunnel lining and strengthen tunnel externally, repair chutes	As required (target within 48 hours)	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - If Conveyor 7C or 8C is unserviceable: Coal to be loaded out of the stock pile via front end loader operation to load train - If Conveyor 4C, 4F, 5F or 3R is unserviceable: Stockpile coal in emergency stockpile until repairs can be completed	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Drift	Convergence of sides and roof/floor Cracking of portal structure Misalignment of jointed track Misalignment of drift conveyor Loss of egress, temporary closure of mine	Medium	None	Follow general procedures	-	-
				Conduct geotechnical assessment of drift	Complete	Byrnes Geotechnical
				Structural supports, roof bolts and mesh protection where defects have been identified	Complete (existing)	Tahmoor Coal
				Local 3D survey along first 40 metres of Drift	Baseline survey prior to 1000m of LW S1A LW S1A and LW S2A: Weekly after 1500m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Visual inspections along Drift	Daily (routine)	Tahmoor Coal
			Opening or Closure between sides of Drift or between marks along length of Drift exceeds 10mm or Visual inspections detect impact to Drift	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - Provide additional mesh and structure support to roof and walls to maintain access - Repair cracks to concrete elements - Adjust track and/or conveyor alignment - Repair services	As required (target within 48 hours)	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - cease underground operations - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - re-establish safe conditions in Drift - decide whether to continue LW operation in current LW panel or relocate LW equipment to next panel	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal
Winder	Twist of Winder Cracks to concrete slab Loss of egress, temporary closure of mine	Low	None	Follow general procedures	-	-
				Condition monitoring of Winder equipment	Ongoing (existing)	Tahmoor Coal
				Continuous tilt monitoring of Winder equipment	Installed Continuous readings, with data averaged over 24 hours and recorded once per day	Tahmoor Coal (SweetingConsulting)
				Local 3D survey around Winder House	Baseline survey prior to 900m of LW S1A End of LW S1A-S3A	Tahmoor Coal (SMEC)
			Non-conventional movements at Winder resulting in measurable twist of Winder or Condition monitoring detects adverse change or Visual inspections detect cracks to concrete slab	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - relevel Winder equipment - Repair cracks to concrete slab - Repair services	As required (target within 48 hours)	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - cease underground operations - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - re-establish safe operation of Winder - decide whether to continue LW operation in current LW panel or relocate LW equipment to next LW panel	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Rail Loop including Rail Overbridge	Impacts on track geometry and rail stress Buckling of Armco structure or reduction in structure clearances below standards	Low	None	Follow general procedures, including rail loop surveys	-	-
				Long bay length ground surveys along Rail Loop	Pegs installed. Baseline survey completed. LW S1A and LW S2A: Weekly after 1300m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SRS)
				Local 3D survey of entry and exit of culvert	Baseline survey prior to 900m of LW S1A LW S1A and LW S2A: Weekly after 1300m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SRS)
				Track geometry surveys using track geometry trolley	Baseline survey prior to 900m of LW S1A LW S1A: Weekly after 1300m until one month after end of LW, and continue if ongoing adverse movements are observed LW S2A: Survey after more than 20 mm of vertical subsidence is measured along the Rail Loop during LW S2A, and for every 20 mm of additional vertical subsidence thereafter	Tahmoor Coal (RMC)
				Track inspection by qualified mine track certifier	LW S1A: Daily after 1300 m until one month after end of LW and continue if ongoing adverse movements are observed LW S2A: Inspect after more than 20 mm of vertical subsidence is measured along the Rail Loop during LW S2A, and for every 20 mm of additional vertical subsidence thereafter	Tahmoor Coal / RMC
			Non-conventional ground movements observed from ground surveys or Adverse change in track geometry observed from track geometry trolley or visual inspections	Notify RMG and Resources Regulator	Within one week	Tahmoor Coal
				RMG meet to decide whether any additional management measures are required, including: - investigate cause - assess monitoring data for trends and forecast future adverse changes that might occur - consider whether to increase survey and/or inspection frequencies - consider whether to resurface the track - consider whether any other additional management measures are req'd	As required	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			More than 10 mm change in length of long bays or Adverse change in track geometry observed from track geometry trolley or visual inspections	Notify RMG and Resources Regulator	Within one week	Tahmoor Coal
				RMG meet to decide whether any additional management measures are required, including: - investigate cause - assess monitoring data for trends, weather forecasts and forecast future adverse changes that might occur - consider conducting Verse test to measure SFT - consider whether to conduct additional ground surveys and/or track geometry surveys - consider whether to increase survey and/or inspection frequencies - consider whether to cut temporary joint in rail or adjust CWR track - consider whether any other additional management measures are req'd	As required	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - stop trains - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - repair impacts relating to hazard	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Concrete silo bins	Cracking of ground slabs Cracking of silo linings Stress of internal steel frames	Low	None	Follow general procedures	-	-
				Conduct structural assessment of silo bins	Complete	JMA
				Local 3D survey around silo bins, including marks at top to measure tilt	Baseline survey prior to 900m of LW S1A End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Continuous tilt monitoring (or extensometers) of 2 x 1250t raw coal bins across join between bins	Install prior to 1300m of LW S1A Tiltmeters (or extensometers) - Continuous readings, with data averaged over 24 hours and recorded once per day End of LW S1A-S3A	Tahmoor Coal
			New cracks > 0.5 mm observed	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - Repair cracks to concrete slab and/or silo lining - Strengthen internal steel frames - Repair services - Reduce storage capacity of silo bins	As required (target within 48 hours)	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - If 6000t bin is unserviceable, coal to be loaded out of Stockpile Area via front end loaders to load trains - If 2 x 1250t raw coal bins become unserviceable, stockpile coal in emergency stockpile until repairs are completed	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Building structures	Stress and twist of steel frames Cracks to concrete slabs	Low	None	Follow general procedures	-	-
				Local 3D survey at base of four legs and at tops of Rail Loader	Baseline survey prior to 900m of LW S1A LW S1A and LW S2A: Weekly after 1200m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Local 3D survey at base of four legs and at tops of Reject Bin	Baseline survey prior to 900m of LW S1A LW S1A and LW S2A: Weekly after 1200m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SRS)
				Local 3D survey around buildings within mine site as per Drawing No. MSEC1247-01	Baseline survey prior to 900m of LW S1A End of LW S1A-S3A	Tahmoor Coal (SMEC)
			Changes in distance between four legs of Rail Loader or Reject Bin exceed 5mm Non-conventional movements identified from general mine site surveys or Visual inspections impacts to building	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - Adjust hold down bolts and install shims to underside of baseplates - Elongating holes in the transoms of Rail Loader - Install horizontal shoring between underpass walls or install rock bolts beneath Rail Loader - Strengthen internal steel frames - Repair services - Reduce storage capacity of Rail Loader or Reject Bin	As required (target within 48 hours)	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - If Washery is unserviceable, stockpile coal in emergency stockpile until repairs are completed - If other buildings become unserviceable, isolate and repair	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Overhead crane and monorails	Changes in alignment or rail span leading to loss of serviceability Increased wear on crane rails and wheels	Medium	None	Follow general procedures	-	-
				Conduct engineering assessment of overhead crane and monorails	Complete	WM Consultants
				Machine wheels on overhead crane to widen groove to meet operating tolerances	Complete	Tahmoor Coal
				Anti-derailment device on overhead crane	Complete	Tahmoor Coal
				Baseline alignment survey of overhead crane rails	Complete	Tahmoor Coal (SRS)
				Briefing of operators of overhead crane and monorails	Prior to 1300m of LW S1A	Tahmoor Coal
				Local 3D survey around Washery building as per Drawing No. MSEC1247-01	Baseline survey prior to 900m of LW S1A End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Local 3D survey along crane rails	Baseline survey prior to 900m of LW S1A LW S1A and LW S2A: Weekly after 1300m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SRS)
				Crane maintenance and inspections by crane technician	LW S1A and LW S2A: Weekly after 1300m until one month after end of LW, and continue if ongoing adverse movements are observed	Tahmoor Coal
			Triggers exceeded for overhead crane or monorails as defined in Table 4.7 or Table 4.8 of this Management Plan	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - Inspect and test operation of overhead crane or monorail by crane engineer - Adjust overhead crane or adjust crane rails - Restrict operation of overhead crane or monorail	As required (target within 48 hours)	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - install temporary stop blocks to prevent crane operation within hazardous area - isolate and repair - use alternate hoists and monorail beams to complete work tasks	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Shaft No. 3	Sliding of bedding planes intersecting shaft Reduction in clearance to cage and/or counterweight Tilt of shaft winder Loss of egress, temporary closure of mine	Low	None	Follow general procedures	-	-
				Conduct geotechnical assessment of Shaft No. 3	Complete	Byrnes Geotechnical
				Structural supports of shaft liner where defects have been identified	Complete (existing)	Tahmoor Coal
				Condition monitoring of shaft winder equipment	Ongoing (existing)	Tahmoor Coal
				Continuous tilt monitoring of shaft winder	Installed Continuous readings, with data averaged over 24 hours and recorded once per day	Tahmoor Coal (SweetingConsulting)
				Local 3D survey around Shaft No. 3 at surface	Baseline survey prior to 1000m of LW S1A End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Visual inspections along Shaft No. 3 including clearance measurements each shift	Daily (routine – each shift)	Tahmoor Coal
				Additional clearance measurement at 135m depth at point of min. clearance	LW S1A and LW S2A: Weekly after 1500m until one month after end of LW, and continue if ongoing adverse movements are observed	Tahmoor Coal
			Change in clearance exceeds 10mm (allowing for swing of cage) or Opening of cracks in concrete liners or Lateral movement detected at joins to concrete liners or Noticeable increase or decrease in water make or Cracking of concrete behind exposed mesh	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - Provide additional mesh and structure support to shaft walls - Slow shaft winder speed - Repair services - Reinstate clearances	As required (target within 48 hours)	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - cease underground operations - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - re-establish safe operation of Shaft No. 3 - decide whether to continue LW operation in current LW panel or relocate LW equipment to next LW panel	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Dams	Loss of stability of dam wall Leakage of dam wall Dam break flooding railway track or polluting waterways	Low	None	Follow general procedures	-	-
				Conduct geotechnical assessment of dams	Complete	Douglas Partners
				Clearing of vegetation around dam wall batter slopes, spillway and overflow areas	Dam S4: Prior to 1000m of LW S1A Dams on mine site: Prior to 1200m of LW S1A	Tahmoor Coal
				Clearing of railway culverts downstream of Dams S2 and S3	Complete	Tahmoor Coal (RMC)
				Monitor and maintain dam water levels as per Mine Water Management Plan (e.g. Dam S4 alarmed at 30%, 90% and 100% capacity)	Ongoing	Tahmoor Coal
				Local 3D survey around Dams S2, S3 and S4	Baseline survey prior to 900m of LW S1A Dam S4: LW S1A and LW S2A: Weekly after 1000m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A Dams S2 and S3: LW S1A and LW S2A: Weekly after 1200m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Local 3D survey around Dams M1, M2, M3, M4, T1, T2, STP1 and STP2	Baseline survey prior to 900m of LW S1A End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Visual inspections of Dams S2 and S3 from rail corridor by Track Certifier	Daily during active subsidence as per Railway Management Plan	Tahmoor Coal (RMC)
				Visual inspections of Dams S2 and S3 from rail corridor by geotechnical engineer	Weekly during active subsidence as per Railway Management Plan	Tahmoor Coal (Newcastle Geotech)
				Visual inspection of dams on mine site by building inspector	Weekly for dams within active subsidence zone	Tahmoor Coal (BIS)
				Visual inspection of dams on mine site by geotechnical engineer	Monthly for dams within active subsidence zone	Tahmoor Coal (Douglas Partners)
			Cracks observed in dam wall > 10 mm wide (other than natural desiccation cracking) or Seepage observed in dam wall	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				Notify ARTC and Tahmoor Coal's Rail Management Group if impacts relate to Dams S1 and S2	Immediately	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - place material at the toe of the embankment - raise freeboard of Dam S2 - temporarily lower or dewater a dam or fill to repair the dam wall and divert water via pumps and temporary pipes if required to continue managing water around the mine site for operational and firefighting purposes - brief mine site workers to restrict access downstream of affected dam	As required (target within 48 hours)	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				Notify ARTC and Tahmoor Coal's Rail Management Group if impacts relate to Dams S1 and S2	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - emergency dewatering of dam - manage site water requirements to ensure all systems have water supply - manage rail operations under continuous watch by Track Certifier in consultation with ARTC if impact relates to Dams S2 and S3	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Reject Emplacement Area	Cracking to batter slopes Cracking to unsealed pavements Cracking to drainage structures	Low	None	Follow general procedures	-	-
				2D survey line along Tahmoor Mine property boundary and alongside (V Line)	Pegs installed. Baseline survey prior to commencement of LW S1A. Monthly survey during LW S1A between 200m and 1300m extraction, and continue if ongoing adverse movements are observed. End of LW S1A.	Tahmoor Coal (SMEC)
			Cracking observed in batter slopes or pavements or drainage structures	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - Repair cracks to batter slopes, pavements and culverts - Repair services	As required (target within 48 hours)	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - repair impacts relating to hazard	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal
Site services	Water / sewage leak Gas leak Loss of electrical or communications services	Low	None	Follow general procedures	-	-
				Set alarms to water monitoring line between Dams S2 and S3 in the CHPP Control Room	Prior to 1200m of LW S1A	Tahmoor Coal
				Local 3D survey around Dams S2 and S3, including high pressure water pipeline between Dams S2 and S3	Baseline survey prior to 900m of LW S1A Dams S2 and S3: LW S1A and LW S2A: Weekly after 1200m until one month after end of LW, and continue if ongoing adverse movements are observed End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Local 3D survey around buildings within mine site as per Drawing No. MSEC1247-01	Baseline survey prior to 900m of LW S1A End of LW S1A-S3A	Tahmoor Coal (SMEC)
			Non-conventional movements identified from general mine site surveys or dam surveys or Visual inspections impacts to building or dams or ground surface or Loss of service	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - Loosen saddles clamping above-ground water lines between Dams S2 and S3 - Repair services	As required (target within 48 hours)	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - repair impacts relating to hazard	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Hazardous materials and Storage of equipment and materials	Exposure of hazardous materials Tilting of storage shelving	Low	None	Follow general procedures	-	-
				2D survey line along Tahmoor Mine property boundary and alongside (V Line)	Pegs installed. Baseline survey prior to commencement of LW S1A. Monthly survey during LW S1A between 200m and 1300m extraction, and continue if ongoing adverse movements are observed. End of LW S1A.	Tahmoor Coal (SMEC)
				Local 3D survey around buildings within mine site as per Drawing No. MSEC1247-01	Baseline survey prior to 900m of LW S1A End of LW S1A-S3A	Tahmoor Coal (SMEC)
				Visual inspections as per general procedures, including Fuel Storage Area	Weekly within the active subsidence zone until one month after end of LW, and continue if ongoing adverse movements are observed	Tahmoor Coal (BIS)
			Cracking to bunded walls, detection of fuel leak	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - Repair cracks and fuel leaks - Repair services	As required (target within 48 hours)	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - repair impacts relating to hazard	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal
Internal roads, pavements and fencing	Cracking to pavements, localised buckling of fencing	Low	None	Follow general procedures	-	-
				Local 3D survey around buildings within mine site as per Drawing No. MSEC1247-01	Baseline survey prior to 900m of LW S1A End of LW S1A-S3A	Tahmoor Coal (SMEC)
			Non-conventional movements identified from general mine site surveys or dam surveys or Visual inspections impacts to roads, pavements of fencing	Notify IMG and Resources Regulator	Within one week	Tahmoor Coal
				IMG meet to decide whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - Repair roads, pavements and fencing	As required	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - emergency evacuation of hazardous area - demarcation to prevent people entering hazardous area - repair impacts relating to hazard	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal

Table 4.1 Control Procedures for Australian Wildlife Sanctuary during the extraction of Tahmoor South Longwalls S1A to S6A and Longwalls S1B to S6B

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQUENCY	BY WHOM?
IMPACTS ON BUILDING STRUCTURES, DINGO SANCTUARY, EXTERNAL PAVEMENTS, WALKING TRAILS, FENCES AND GATES	None	Undertake structural inspections and assessments before subsidence.	Inspection completed January 2020. Re-inspection completed February 2022..	Tahmoor Coal
		Undertake inspections and assessments to identify changes and new features and consider whether additional monitoring and management measures are required	Prior to start of LWs S2A, S3A and S4A	Tahmoor Coal
		Undertake heritage assessment	Complete	Tahmoor Coal
		Undertake asbestos materials survey	Prior to start of LW S1A	Tahmoor Coal
		Install protection measures for glass roof panels in glasshouse	Prior to start of LW S2A	Tahmoor Coal
		Continuous GNSS monitoring	Installed Continuous readings, with data average over 24 hours and recorded once per day	Tahmoor Coal
		2D Survey along Charlies Point Road	Install survey pegs and conduct baseline surveys prior to start of LW S1A. Survey monthly for pegs between 200 m and 800 m and continue if ongoing adverse movements are observed.. Survey at end of each LW for pegs located within zone of influence of each LW.	Tahmoor Coal
		3D/2D Survey along Main Southern Railway and Remembrance Drive	Install and baseline survey pegs within predicted limit of incremental subsidence of each active LW, prior to active LW face approaching within 600 m of survey line. Monthly 3D / Weekly 2D during periods of active subsidence and continue if ongoing adverse movements are observed. Survey at end of each LW for pegs located within zone of influence of each LW.	Tahmoor Coal
		Local 3D survey around perimeter of main buildings	Install survey pegs and conduct baseline surveys prior to influence of LW S2A. Survey weekly for pegs located with active subsidence zone and continue if ongoing adverse changes are observed. Survey at end of each LW for pegs located within zone of influence of each LW.	Tahmoor Coal
		Visually inspect the structures, Dingo Sanctuary, external pavements, fences and gates, farm dam, walking trails	Conduct baseline inspections prior to influence of LW S2A. Inspect weekly for areas located with active subsidence zone or for one month after each LW is completed and continue if ongoing adverse changes are observed.	Tahmoor Coal
		Conduct asbestos air monitoring	Weekly for structures located within active subsidence zone until rates of change in subsidence reduce to negligible levels.	Tahmoor Coal
		Report findings of surveys and inspections to National Trust, Australian Wild Sanctuary, Australian Native Dog Conservation Society, AWS SMG, Subsidence Advisory NSW, Resources Regulator	Weekly when Australian Wildlife Sanctuary is within active subsidence zone, unless adverse changes observed.	Tahmoor Coal
		Review and assess monitoring report and consider whether any additional management measures are required	Weekly whilst within active subsidence zone and continue if ongoing adverse changes are observed.	AWS SMG

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQUENCY	BY WHOM?
IMPACTS ON BUILDING STRUCTURES, DINGO SANCTUARY, EXTERNAL PAVEMENTS, WALKING TRAILS, FENCES AND GATES (continued)	Adverse analytical finding from asbestos air monitoring	Notify Australian Wildlife Sanctuary	Immediately	Tahmoor Coal
		AWS SMG meet and consider whether any additional management measures are required, including: - inspection by specialist in asbestos repairs and repair cracks if required - increase monitoring and reporting procedures	Within 24 hours	AWS SMG
		Notify AWS SMG of trigger exceedence and any management decisions undertaken (incl Australian Wildlife Sanctuary and Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal
	Impact observed to asbestos containing materials	Notify Australian Wildlife Sanctuary	Immediately	Tahmoor Coal
		AWS SMG meet and consider whether any additional management measures are required, including: - seal fresh cracks by a licensed asbestos contractor - inspection by specialist in asbestos repairs and repair cracks if required - increase monitoring and reporting procedures	Within 24 hours	AWS SMG
		Notify AWS SMG of trigger exceedence and any management decisions undertaken (incl Australian Wildlife Sanctuary and Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal
	Impacts observed on structure	AWS SMG meet and consider whether any additional management measures are required, including: - structural inspection - increase monitoring and reporting procedures - undertake detailed inspections or surveys of impacts - seal fresh cracks by a licensed asbestos contractor - repair impacts, in consultation with heritage specialist if impacts occur to item of heritage significance	Within 1 week or earlier if required	AWS SMG
		Notify AWS SMG of trigger exceedence and any management decisions undertaken (incl Australian Wildlife Sanctuary and Subsidence Advisory NSW, Resources Regulator)	Within 24 hours	Tahmoor Coal
	A hazard has been identified that involves potential serious injury or illness to a person or persons at the property, and cannot be controlled	Tahmoor Coal and Australian Wildlife Sanctuary meet with AWS SMG to decide whether any additional management measures are required, including: - suspension of work activities within the hazardous area - demarcation of workplace to restrict people from entering or working in hazardous area - emergency evacuation of workplace	Immediately	AWS SMG
		Notify AWS SMG of trigger exceedence and any management decisions undertaken (incl Australian Wildlife Sanctuary and Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal
IMPACTS ON FIRE PROTECTION SERVICES, SECURITY SERVICES, INTEGRITY OF FENCES AND GATES IN DINGO SANCTUARY, ESSENTIAL SERVICES, ACCESS AND MOBILITY, FINISHES, AND PUBLIC SAFETY HAZARDS	None	Follow procedures for building structures	-	-
	Impacts observed generally	Repair impacts	As required by Australian Wildlife Sanctuary to avoid interruption to operations (target within 24 hours if required)	Tahmoor Coal

RISK ISSUE	TRIGGER	CONTROL PROCEDURES	TIMING & FREQUENCY	BY WHOM?
IMPACTS ON NATURAL FEATURES **Trigger Level** / **Description** **Level 1** — No observed impacts to pool level, drainage or overland connected flow observed **Level 2** — Visually observed reduction in pool level, drainage or overland connected flow. AND The above has occurred at one of the upstream pools (beyond mining effects). AND Visual monitoring of pools has not noted any mining related impacts. **Level 3** — Rock bar and/or stream base cracking, or gas release, or iron precipitation noted during visual inspection. AND No reduction in pool water level, drainage or overland connected flow, taking into account climatic conditions and observations during baseline monitoring period. **Level 4** — Visually observed reduction in pool water level, drainage or overland connected flow. AND The above change has not occurred at one of the upstream pools (beyond mining effects).	None (Level 1)	Follow procedures for building structures	-	-
		Conduct pre-mining, baseline monitoring of pool water levels and water quality within Wirrimbirra Creek	Prior to start of LW S1A	Tahmoor Coal
		Conduct pre-mining, baseline inspections of small cliffs along Wirrimbirra Creek and provide briefing note to AWS staff and volunteers to avoid standing beneath them	Prior to start of LW S1A	Tahmoor Coal
		Ground surveys across Wirrimbirra Creek, including the controlling dam at Ockenden Pools and rockbar at the Big Pool	Install survey pegs and conduct baseline surveys prior to influence of LW S1A. Survey at end of each LW.	Tahmoor Coal
		Monitoring of water levels and water quality in Ockenden Pools and the Big Pool (and other pools if identified during baseline monitoring)	Continuous readings, downloaded monthly	Tahmoor Coal
		Visual inspections of streams and small cliffs (from safe vantage points)	Inspect monthly for areas within active subsidence zone or for one month after each LW is completed and continue if ongoing adverse changes are observed Inspection at end of each LW.	Tahmoor Coal
	Level 2	Tahmoor Coal consider whether any additional management measures are required, including: - increase monitoring and reporting procedures	Within 1 month or earlier if required	Tahmoor Coal
	Level 3	Tahmoor Coal consider whether any additional management measures are required, including: - investigation whether there has been a reduction in pool water level, drainage or overland connected flow, taking into account climatic conditions and observations during baseline monitoring period - investigation to assess if the observed change is related to mining effects, other catchment changes or the prevailing climate - increase monitoring and reporting procedures	Within 1 week or earlier if required	Tahmoor Coal
		Notify AWS of trigger exceedence and any management decisions undertaken	Within 1 week of decision	Tahmoor Coal
	Level 4	Tahmoor Coal consider whether any additional management measures are required, including: - investigation to assess if the observed change is related to mining effects, other catchment changes or the prevailing climate - increase monitoring and reporting procedures - if it is concluded that the impact is due to mining, implement a corrective management action plan (CMAP) in consultation with Australian Wildlife Sanctuary	Within 1 week or earlier if required	Tahmoor Coal
		Notify AWS of trigger exceedence and any management decisions undertaken	Within 1 week of decision	Tahmoor Coal

Table 4.1 Risk Control Procedures for Picton Weir during the extraction of Tahmoor LW S3A-S7A

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Picton Weir	Subsidence effects such as Valley Closure, Valley Upsidence, Valley Opening or Lateral Bending / Shearer at or below the Weir level, loss of structural integrity of the Weir leading to a rapid loss of water retention.	Low	None	Conduct geotechnical assessment of Picton Weir	Complete	PSM
				Conduct structural assessment of Picton Weir	Complete	Worley
				Continuous GNSS monitoring as shown in Drawing No. MSEC1193-12-04, particularly GNSS units S13, S14, and S19 to S25	GNSS units installed Continuous readings, with data averaged over 24 hours and recorded once per day until end of LW S7A and continue if ongoing adverse movements are observed	Tahmoor Coal (Geomatix)
				Conduct 2D / Absolute 3D surveys along Main Southern Railway in accordance with Railway Management Plan	Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone during LWs S3A to S7A	Tahmoor Coal (SRS)
				Conduct 2D / Absolute 3D surveys along local streets in accordance with Wollondilly Shire Council Management Plan	Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone during LWs S3A to S7A	Tahmoor Coal (SMEC)
				Conduct 2D / Absolute 3D surveys of survey marks on both sides of the Picton Weir as shown in Drawing No. MSEC1193-12-04	Baseline survey complete Monthly during extraction of LWs S4A to S7A and continue if ongoing adverse movements are observed	Tahmoor Coal (Geomatix)
				Automated, continuous measurements across the Picton Weir by laser distancemeters downstream of Picton Weir (rock to rock)	Install and commission prior to start of LW S4A. Hourly readings until end of LW S7A and continue if ongoing adverse movements are observed	Tahmoor Coal (SweetingConsulting)
				Photogrammetric survey of shape of dam wall and surrounding rock faces on both sides of Picton Weir	Baseline survey complete Additional surveys if triggered by monitoring results	Tahmoor Coal (Geomatix)
				Vertical inclinometer monitoring in borehole BH01 at northern side of Picton Weir	Installed and baseline surveyed End of LW S3A and LW S4A Monthly during LWs S5A, S6A and LW S7A and continue if ongoing adverse movements are observed	Tahmoor Coal (Lynton Surveys)
				Groundwater level monitoring in borehole BH01 at northern side of Picton Weir	Installed and commissioned Download end of LW S3A and LW S4A and monthly during LWs S5A to S7A and continue if ongoing adverse movements are observed	Tahmoor Coal (Lynton Surveys)
				Surface water level monitoring upstream of Picton Weir	Install and commission prior to start of LW S4A. Hourly readings until end of LW S7A and continue if ongoing adverse movements are observed and continue if ongoing adverse movements are observed	Tahmoor Coal (SweetingConsulting)
				Detailed visual inspection of Picton Weir and surrounding rockfaces by UAV	Baseline inspection complete End of LW S3A and LW S4A Monthly during LWs S5A to S7A and continue if ongoing adverse movements are observed	Tahmoor Coal (Geomatix)
				Visual inspections of Picton Weir, surrounding rock faces and access road	Monthly during LWs S5A to S7A and continue if ongoing adverse movements are observed	Tahmoor Coal
				Analyse and report results to IMG and Wollondilly Shire Council	Monthly during extraction of LWs S4A and S5A Monthly from start of LWs S6A and S7A, then increase to weekly when distance between LW face and Picton Weir is less than 1000 metres (after length of extraction of LW S6A exceeds 1800 m and LW S7A exceeds 1200 m) and continue if ongoing adverse movements are observed	Tahmoor Coal (MSEC)
				IMG discuss results and consider whether any additional management measures are required	End of LW S3A and LW S4A Monthly during LWs S5A to S7A and continue if ongoing adverse movements are observed	IMG

INFRASTRUCTURE	HAZARD / IMPACT	RISK	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
Picton Weir	Subsidence effects such as Valley Closure, Valley Upsidence, Valley Opening or Lateral Bending / Shearer at or below the Weir level, loss of structural integrity of the Weir leading to a rapid loss of water retention.	Low	Laser distancemeters measure either Opening > 4mm Closure < -5mm (taking into account changes due to environmental factors)	Notify IMG	Within 24 hours	Tahmoor Coal
				Undertake additional visual inspection	Within 24 hours	Tahmoor Coal
				IMG meet and review latest monitoring information for Picton Weir. IMG consider whether any additional management measures are required, which may include: - increase monitoring frequencies and reporting procedures - repair cracks of spray shotcrete to seal cracks on upstream face of Weir - install post-tensioned anchors to reduce impacts - place concrete at the downstream base of the Weir to reduce impacts - install rock slot to the side of Picton Weir - prevent public access to the Picton Weir and install signage	Within 24 hours	IMG
				Report trigger exceedance and actions taken to IMG, Wollondilly Shire Council, SA NSW & MSO in Status Report	Within one week	Tahmoor Coal
			New crack identified in Picton Weir	Notify IMG	Within 24 hours	Tahmoor Coal
				Undertake additional visual inspection by structural dam engineer	Within 24 hours	Worley
				IMG meet and review latest monitoring information for Picton Weir. IMG consider whether any additional management measures are required, which may include: - increase monitoring frequencies and reporting procedures - repair cracks of spray shotcrete to seal cracks on upstream face of Weir - install post-tensioned anchors to reduce impacts - place concrete blocks or buttresses downstream of the Weir to reduce impacts - install rock slot to the side of Picton Weir - prevent public access to the Picton Weir and install signage	Within 24 hours	IMG
				Report trigger exceedance and actions taken to IMG, Wollondilly Shire Council, SA NSW & MSO in Status Report	Within one week	Tahmoor Coal
			A hazard has been identified that involves potential serious injury or illness to a person or persons and cannot be controlled	Notify IMG and Tahmoor Coal Senior Management Group and implement any required actions	Immediately	Tahmoor Coal
				IMG, Wollondilly Shire Council and Tahmoor Coal Senior Management Group meet to decide whether any additional management measures are required, including: - prevent public access to the Picton Weir and install signage - delay or stop mining	Immediately	Tahmoor Coal
				Report details of exceedance of trigger level and actions undertaken to Resources Regulator	Within 24 hours of decision	Tahmoor Coal

Revised Table 4.1: Risk Control Procedures LW S1A-S6A (amended for LW S3A in blue)

RISK ISSUE	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
IMPACTS ON BUILDINGS, FUEL TANKS AND LINES, WALLS, PAVEMENTS, GATES AND DAM	None	Undertake structural inspections and assessments before subsidence	Complete	Tahmoor Coal (JMA)
		Undertake workplace health and safety inspection	Complete	Tahmoor Coal (MSIA)
		Conduct pressure testing of fuel tanks and fuel lines	Baseline test complete Additional test after Tank UST#2 is repaired (complete) End of LW S3A Additional test after end of LW S3A if more than 50 mm additional subsidence develops at the petrol station and for every 50 mm thereafter	Tahmoor Coal (Tanknology)
		Conduct on-site groundwater testing (visual inspection and hydrocarbon testing)	Baseline test complete Monthly test during active subsidence zone as per below: LW S1A-S2A: after 1300m extraction until one month after end of LW LW S3A: after 1200m extraction until one month after end of LW Additional test after end of LW S3A if more than 50 mm additional subsidence develops at the petrol station and for every 50 mm thereafter	Tahmoor Coal (AEC)
		Conduct fuel balance monitoring	Monthly as per standard practice Weekly test during active subsidence zone as per below: LW S1A- S2A: after 1300m extraction until one month after end of LW LW S3A: after 1200m extraction until one month after end of LW	Tahmoor Coal (Bargo Petroleum)
		Conduct 2D / Absolute 3D surveys along Remembrance Drive	Baseline survey complete. Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone: Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of LW S1A-S6A.	Tahmoor Coal (SMEC)
		Local 3D survey around perimeter of buildings during active subsidence as per **Error! Reference source not found.**	Baseline survey complete Weekly surveys during active subsidence zone as per below: LW S1A-S2A: after 1300m extraction until one month after end of LW LW S3A: after 1200m extraction until one month after end of LW Continue surveys if ongoing adverse movements are observed. End of LW S1A-S6A.	Tahmoor Coal (SMEC)
		Visually inspect the property, including the petrol station, store, workshop, Wrecker's yard, igloos, dam, pavements, fences and gates	Weekly inspection during active subsidence zone as per below: LWs S1A - S2A: after 1300m extraction until one month after end of LW LW S3A: after 1200m extraction until one month after end of LW Continue inspections if ongoing adverse movements are observed. End of LW S1A-S6A.	Tahmoor Coal (BIS)
		Report findings of surveys and inspections to landowner and tenants, SRG, Subsidence Advisory NSW, Resources Regulator	LWs S1A - S2A: after 1300m extraction until one month after end of LW LW S3A: after 1200m extraction until one month after end of LW Continue reporting if ongoing adverse movements are observed End of LW S1A-S6A.	Tahmoor Coal (MSEC)
		Review and assess monitoring report and consider whether any additional management measures are required	LWs S1A - S2A: after 1300m extraction until one month after end of LW LW S3A: after 1200m extraction until one month after end of LW Continue reviews if ongoing adverse movements are observed End of LW S1A-S6A.	SRG

RISK ISSUE	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
IMPACTS ON BUILDINGS, FUEL TANKS AND LINES, WALLS, PAVEMENTS, GATES AND DAM (continued)	Non-conventional movements identified from weekly surveys or Visual inspections identify impacts to buildings or pavements or Integrity testing of fuel tanks and fuel lines indicates potential leakage of fuel	SRG meet and consider whether any additional management measures are required, including: - structural inspection - additional testing of integrity of fuel tanks and fuel lines - increase monitoring and reporting procedures - repair impacts	Within 1 week or earlier if required	SRG
		Notify SRG of trigger exceedence and any management decisions undertaken (incl landowner and tenants, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
	A hazard has been identified that involves potential serious injury or illness to a person or persons at No. 3030 Remembrance Drive, Bargo and cannot be controlled	SRG, Tahmoor Coal, landowner and tenants meet to decide whether any additional management measures are required, including: - suspension of work activities within the hazardous area - demarcation of workplace to restrict people from entering or working in hazardous area - emergency evacuation of workplace	Immediately	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl landowner and tenants, Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal
IMPACTS ON FUELTANKS, FUEL LINES, FIRE PROTECTION SERVICES, SECURITY SERVICES, ESSENTIAL SERVICES, ACCESS AND MOBILITY, FINISHES, AND PUBLIC SAFETY HAZARDS	None	Follow procedures above	-	-
	Impacts observed	Repair impacts	Immediately as required by landowner and tenants to avoid interruption to operations (target within 24 hours if required)	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl landowner and tenants, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
IMPACTS ON VEHICLE HOISTS	None	Follow procedures above	-	-
		Baseline alignment survey of vehicle hoists	Complete	Tahmoor Coal (SweetingConsulting)
	Non-conventional movements identified from weekly surveys around Frapen workshop or Visual inspections identify impacts to Frapen workshop or Reduced performance by machine observed	SRG meet and consider whether any additional management measures are required, including: - Additional alignment survey - increase monitoring and reporting procedures - relevel hoist(s)	Within 1 week or earlier if required	SRG
		Notify SRG of trigger exceedence and any management decisions undertaken (incl landowner and Frapen Motorsports, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
IMPACTS ON STORAGE AND MATERIALS HANDLING	None	Follow procedures above	-	-
	Substantial tilt of storage shelves and racks observed or Non-conventional movements identified from weekly surveys outside Wrecker's yard	SRG meet and consider whether any additional management measures are required, including: - relevel storage shelves - provide additional support to shelving	As required by landowner and tenants to avoid interruption to operations (target within 24 hours if required)	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl landowner and tenants, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal

RISK ISSUE	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
IMPACTS ON DAM	None	Follow procedures above	-	-
	Cracks observed in dam wall > 10 mm wide (other than natural desiccation cracking) or Seepage observed in dam wall	SRG meet and consider whether any additional management measures are required, including: - increase in frequency of surveys, visual inspections and reporting - place material at the toe of the embankment - temporarily lower or dewater dam or repair the dam wall	As required (target within 48 hours)	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl landowner and tenants, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal

Table 4.1 Risk Control Procedures during the extraction of Tahmoor LW S1A-S6A

RISK ISSUE	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
IMPACTS ON BUILDING STRUCTURE AND EXTERNAL PAVEMENTS, FENCES AND GATES	None	Undertake structural inspections and assessments before subsidence	Complete	Tahmoor Coal (JMA)
		Conduct 2D / Absolute 3D surveys along Remembrance Drive	Baseline survey complete. Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone: Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of LW S1A-S6A.	Tahmoor Coal (SMEC)
		2D survey along Wollondilly Anglican College property boundary monitoring line during active subsidence, as per Fig. 4.1	Pegs installed and baseline survey completed Weekly surveys during active subsidence zone as per below: LWs S1A and S2A: after 1500m extraction until one month after end of LW Continue surveys if ongoing adverse movements are observed. End of LW S1A-S4A.	Tahmoor Coal (SMEC)
		Local 3D survey around perimeter of poultry sheds during active subsidence, if access is permitted	Install and baseline survey prior to 1300m extraction of LW S1A End of LW S1A-S4A.	Tahmoor Coal (SMEC)
		Visually inspect the structures, external pavements, fences, gates and residence	Baseline inspection complete End of LW S1A-S4A	Tahmoor Coal (BIS)
		Report findings of surveys and inspections to Inghams, SRG, Subsidence Advisory NSW, Resources Regulator	LWs S1A and S2A: after 1500m extraction until one month after end of LW Continue reporting if ongoing adverse movements are observed End of LW S1A-S4A.	Tahmoor Coal
		Review and assess monitoring report and consider whether any additional management measures are required	LWs S1A and S2A: after 1500m extraction until one month after end of LW Continue reviews if ongoing adverse movements are observed End of LW S1A-S4A.	Tahmoor Coal
	Increased or non-conventional movements identified from weekly surveys or Impacts reported on structure	SRG meet and consider whether any additional management measures are required, including: - structural inspection - additional surveys around perimeter of poultry sheds - increase monitoring and reporting procedures - repair impacts	Within 1 week or earlier if required	SRG
		Notify SRG of trigger exceedence and any management decisions undertaken (incl landowner, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
	A hazard has been identified that involves potential serious injury or illness to a person or persons on Inghams property and cannot be controlled	SRG, Tahmoor Coal and Inghams meet to decide whether any additional management measures are required, including: - suspension of work activities within the hazardous area - demarcation of workplace to restrict people from entering or working in hazardous area - emergency evacuation of workplace	Immediately	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl landowner, Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal
IMPACTS ON HYGIENCE INTEGRITY, FIRE PROTECTION SERVICES, SECURITY SERVICES, ESSENTIAL SERVICES, AND PUBLIC SAFETY HAZARDS	None	Follow procedures above	-	-
	Impacts observed	Repair impacts	As required by Inghams to avoid interruption to operations (target within 24 hours if required)	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl landowner, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
IMPACTS ON STORAGE AND MATERIALS HANDLING	None	Follow procedures above	-	-
	Substantial tilt of storage shelves observed	SRG meet and consider whether any additional management measures are required, including: - relevel storage shelves - provide additional support to shelving	As required by Inghams to avoid interruption to operations (target within 24 hours if required)	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl landowner, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal

Revised Table 4.1: Risk Control Procedures LW S1A-S6A (amended for LW S4A in blue)

RISK ISSUE	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
IMPACTS ON BUILDING STRUCTURE AND EXTERNAL PAVEMENTS	None	Undertake structural inspections and assessments before subsidence	Complete	Tahmoor Coal (JMA)
		Relevel outdoor storage racks and conduct baseline tilt measurements	Prior to 1300m of extraction of LW S1A (complete)	Tahmoor Coal (BIS)
		Measure tilt of outdoor storage racks	End of LW S1A-S6A	Tahmoor Coal ~~(BIS)~~
		Conduct 2D / Absolute 3D surveys along Remembrance Drive	Baseline survey complete. Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone: Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of LW S1A-S6A.	Tahmoor Coal (SMEC)
		Local 3D survey around perimeter of café, gift shop, warehouse and residence during active subsidence	Install and baseline survey prior to 900m extraction of LW S1A Weekly surveys during active subsidence zone as per below: LW S1A: after 1300m extraction until end of LW LW S2A: after 1100m extraction until end of LW LWs S3A and S4A: after 1000m extraction until end of LW LWs ~~S4A-~~ S5A: after 1100m extraction until end of LW Continue surveys if ongoing adverse movements are observed. End of LW S1A-S6A.	Tahmoor Coal (SMEC)
		Visually inspect the structures, external pavements, fences, gates and storage racks, and measure tilts of freestanding brick wall	Weekly inspections at the same frequency as the surveys on the property and continue if ongoing adverse movements are observed	Tahmoor Coal ~~(BIS)~~
		Report findings of surveys and inspections to landowner, SRG, Subsidence Advisory NSW, Resources Regulator	Weekly inspections at the same frequency as the surveys on the property and continue if ongoing adverse movements are observed	Tahmoor Coal
		Review and assess monitoring report and consider whether any additional management measures are required	Weekly inspections at the same frequency as the surveys on the property and continue if ongoing adverse movements are observed	Tahmoor Coal
	Impacts observed on structure	SMG meet and consider whether any additional management measures are required, including: - structural inspection - increase monitoring and reporting procedures, including local 3D survey - undertake detailed inspections or surveys of impacts - repair impacts	Within 1 week or earlier if required	SMG
		Notify SMG of trigger exceedence and any management decisions undertaken (incl landowner, Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal
	A hazard has been identified that involves potential serious injury or illness to a person or persons on public property or, or Tahmoor Garden Centre property and cannot be controlled	SMG, Tahmoor Coal and Tahmoor Garden Centre meet to decide whether any additional management measures are required, including: - suspension of work activities within the hazardous area - demarcation of workplace to restrict people from entering or working in hazardous area - emergency evacuation of workplace	Immediately	Tahmoor Coal
		Notify SRG of trigger exceedence and any management decisions undertaken (incl landowner, Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal
IMPACTS ON FIRE PROTECTION SERVICES, SECURITY SERVICES, ESSENTIAL SERVICES, ACCESS AND MOBILITY, FINISHES, AND PUBLIC SAFETY HAZARDS	None	Follow procedures above	-	-
	Impacts observed generally	Repair impacts	As required by Tahmoor Garden Centre to avoid interruption to operations (target within 24 hours if required)	Tahmoor Coal
IMPACTS ON STORAGE AND MATERIALS HANDLING	None	Follow procedures above	-	-
	Substantial tilt of storage shelves observed	SRG meet and consider whether any additional management measures are required, including: - relevel storage shelves - provide additional support to shelving	As required by Tahmoor Garden Centre to avoid interruption to operations (target within 24 hours if required)	Tahmoor Coal

Table 4.1 Risk Control Procedures for No. 3165 Remembrance Drive, Bargo during the extraction of Tahmoor South LW S2A-S7A

RISK ISSUE	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
IMPACTS ON BUILDINGS, SILO HOPPERS, COMMERCIAL STRUCTURES, TANKS, WALLS, PAVEMENTS, FENCES AND GATES	None	Undertake structural inspections and assessments before subsidence	Complete	Tahmoor Coal (JMA)
		Undertake workplace health and safety inspection	Complete	Tahmoor Coal (MSIA)
		Clean and prepare base of silo hopper tower for future relevelling if required (subject to access provided by landowner)	Prior to 500m extraction of LW S3A (complete)	Tahmoor Coal
		Install missing angle tie to base of silo hopper tower on northern side (subject to access provided by landowner)	Prior to 500m extraction of LW S3A (complete)	
		Provide supplementary support to freestanding steel columns supporting first floor of machinery shed and residence (subject to approval by landowner)	Prior to 500m extraction of LW S3A(complete)	Tahmoor Coal
		Baseline survey of alignment of sliding gate	Prior to 600m extraction of LW S2A (complete)	Tahmoor Coal (SMEC)
		Conduct 2D / Absolute 3D surveys along Remembrance Drive and Main Southern Railway	Baseline survey complete. Monthly 3D / Weekly 2D surveys for pegs within active subsidence zone for LW S2A-S7A: Continue surveys until outside active subsidence zone or one month after end of LW and continue further if ongoing adverse movements are observed. End of LW S2A-S7A.	Tahmoor Coal (SMEC)
		Local 3D survey around perimeter of buildings and commercial structures during active subsidence (refer Fig. 4.1)	Baseline survey prior to 600m extraction of LW S2A End of LW S2A Weekly surveys during periods of active subsidence after 450m extraction for LW S3A and LW S4A and after 550m extraction for LW S5A: Continue surveys if ongoing adverse movements are observed. End of LW S2A-S7A.	Tahmoor Coal (SMEC)
		Install tiltmeters on silo hopper tower and monitor changes in tilt	Install and commission prior to 600m extraction of LW S2A (complete) Readings every 2 hours	Tahmoor Coal (SweetingConsulting)
		Visually inspect the property, including the structures, hopper, concrete plant, pavements, fences and gates	Baseline pre-mining inspection complete Weekly inspections during periods of active subsidence after 450m extraction for LW S3A and LW S4A and after 550m extraction for LW S5A-S6A: Continue inspections if ongoing adverse movements are observed. End of LW S2A-S7A.	Tahmoor Coal
		Report findings of surveys and inspections to landowner, SRG, Subsidence Advisory NSW, Resources Regulator	Weekly reports during periods of active subsidence after 450m extraction for LW S3A and LW S4A and after 550m extraction for LW S5A-S6A: Continue reporting if ongoing adverse movements are observed End of LW S2A-S7A.	Tahmoor Coal (MSEC)
		Review and assess monitoring report and consider whether any additional management measures are required	Weekly during periods of active subsidence after 450m extraction for LW S3A and LW S4A and after 550m extraction for LW S5A-S6A: Continue reporting if ongoing adverse movements are observed	SRG

RISK ISSUE	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
IMPACTS ON BUILDINGS, SILO HOPPERS, COMMERCIAL STRUCTURES, TANKS, WALLS, PAVEMENTS, FENCES AND GATES (continued)	Non-conventional movements identified from weekly surveys or Visual inspections identify impacts to buildings or pavements or Change in distance across diagonal of silo hopper tower exceeds 5mm or Tensile or compressive strain between pegs spaced no closer than 7 m apart on ground slab around silo hopper tower exceeds 0.75mm/m	SRG meet and consider whether any additional management measures are required, including: - structural inspection - relevel hopper tower or adjust baseplate connections - saw cut concrete slab surrounding silo hopper - temporarily reduce materials in hoppers while adjustments are undertaken - increase monitoring and reporting procedures - repair impacts	Within 1 week or earlier if required	SRG
		Notify SRG of trigger exceedance and any management decisions undertaken (incl landowner, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
	A hazard has been identified that involves potential serious injury or illness to a person or persons at No. 3165 Remembrance Drive, Bargo and cannot be controlled	SRG, Tahmoor Coal, landowner meet to decide whether any additional management measures are required, including: - suspension of work activities within the hazardous area - demarcation of workplace to restrict people from entering or working in hazardous area - emergency evacuation of workplace	Immediately	Tahmoor Coal
		Notify SRG of trigger exceedance and any management decisions undertaken (incl landowner, Subsidence Advisory NSW, Resources Regulator)	Within 24 hours of decision	Tahmoor Coal
IMPACTS ON SEDIMENTATION TANKS	None	Follow procedures above	-	-
	Impacts observed on water retention tanks	SRG meet and consider whether any additional management measures are required, including: - structural inspection - increase monitoring and reporting procedures including crack width monitoring and local 3D survey - undertake detailed inspections or surveys of impacts - repair impacts - consider installation of waterproof liner	Within 1 week or earlier if required	SRG
		Notify SRG of trigger exceedance and any management decisions undertaken (incl landowner and Subsidence Advisory NSW)	Within 24 hours	Tahmoor Coal
IMPACTS ON FIRE PROTECTION SERVICES, SECURITY SERVICES, ESSENTIAL SERVICES, ACCESS AND MOBILITY, FINISHES, AND PUBLIC SAFETY HAZARDS	None	Follow procedures above	-	-
	Impacts observed	Repair impacts	Immediately as required by landowner to avoid interruption to operations (target within 24 hours if required)	Tahmoor Coal
		Notify SRG of trigger exceedance and any management decisions undertaken (incl landowner, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
	Impacts observed to sliding entrance gate	Repair impacts	As required by landowner to avoid service interruption (target within 24 hours if required)	Tahmoor Coal
		Provide alternative security services while security gate is repaired	As required	
IMPACTS ON MACHINERY AND EQUIPMENT	None	Follow procedures above	-	-
		Baseline precision measurement of levels of hoppers and conveyors	Complete	Tahmoor Coal
	Substantial adverse subsidence movements observed, or reduced performance by machine observed	SRG meet and consider whether any additional management measures are required, including: - measurement of alignment of machinery - relevel machinery - undertake additional detailed measurements of machinery	As required by landowner to avoid business interruption (target within 24 hours if required)	Tahmoor Coal

RISK ISSUE	TRIGGER	CONTROL PROCEDURE/S	FREQUENCY	BY WHOM?
IMPACTS ON STORAGE AND MATERIALS HANDLING	None	Follow procedures above	-	-
	Substantial tilt of storage shelves and racks observed	SRG meet and consider whether any additional management measures are required, including: - relevel storage shelves - provide additional support to shelving	As required by landowner to avoid interruption to operations (target within 24 hours if required)	Tahmoor Coal
		Notify SRG of trigger exceedance and any management decisions undertaken (incl landowner, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
IMPACTS ON SWIMMING POOL AND POOL GATE	None	Visually inspect the swimming pool and pool gate	Baseline inspection (complete) Weekly inspections during periods of active subsidence after 550m extraction for LW S2A, after 450m extraction for LW S3A and LW S4A and after 550m extraction for LW S5A-S6A Continue inspections if ongoing adverse movements are observed. End of LW S2A-S7A.	Tahmoor Coal
	Impacts observed	Repair impacts	As required	Tahmoor Coal
		Notify SRG of trigger exceedance and any management decisions undertaken (incl landowner, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal
	Pool gate won't close	Notify resident and/or landowner, contact Subsidence Advisory NSW to repair gate	Immediately	Tahmoor Coal
		Repair gate	As soon as possible	Tahmoor Coal
IMPACTS ON GRASSED AIR STRIP	None	Visually inspect the grassed air strip	Baseline inspection prior to 600m extraction of LW S2A Weekly inspections during periods of active subsidence after 550m extraction for LW S2A, after 450m extraction for LW S3A and LW S4A and after 550m extraction for LW S5A-S6A: Continue inspections if ongoing adverse movements are observed. End of LW S2A-S7A.	Tahmoor Coal
	Mining-induced cracks or humps observed	Fill cracks or resurface air strip	As required	Tahmoor Coal
		Notify SRG of trigger exceedance and any management decisions undertaken (incl landowner, Subsidence Advisory NSW, Resources Regulator)	Within one week	Tahmoor Coal