



**NSW  
Resources  
Regulator**

**COMPLIANCE AUDIT PROGRAM – SUBSIDENCE MANAGEMENT**

# **TAHMOOR COLLIERY**

Tahmoor Coal Pty Ltd



**Document control**

Published by NSW Resources Regulator

Title: Compliance audit program – Subsidence management: Tahmoor Colliery, Tahmoor Coal Pty Ltd

First published: July 2020

Authorised by: Director Compliance

CM9 reference: DOC20/517776

**AMENDMENT SCHEDULE**

Date	Version	Amendment
July 2020	1	First published
Dec 2020	2	Broken link fixed on page 20

© State of New South Wales through Department of Regional NSW. You may copy, distribute, display, download and otherwise freely deal with this publication for any purpose, provided that you attribute the Department of Regional NSW as the owner. However, you must obtain permission if you wish to charge others for access to the publication (other than at cost); include the publication in advertising or a product for sale; modify the publication; or republish the publication on a website. You may freely link to the publication on a departmental website.

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (July 2020) and may not be accurate, current or complete. The State of New South Wales (including the NSW Department of Regional NSW), the author and the publisher take no responsibility, and will accept no liability, for the accuracy, currency, reliability or correctness of any information included in the document (including material provided by third parties). Readers should make their own inquiries and rely on their own advice when making decisions related to material contained in this publication.

## Contents

1. Introduction .....	4
1.1. Background .....	4
1.2. Audit objectives.....	4
1.3. Audit scope.....	5
1.4. Audit criteria .....	5
1.5. Publishing and disclosure of information .....	6
2. Audit methods .....	7
2.1. Opening meeting.....	7
2.2. Site interviews and inspections .....	7
2.2.1. Data collection and verification .....	7
2.2.2. Site inspections.....	7
2.3. Closing meeting.....	8
2.4. Compliance assessment definitions.....	8
2.5. Reporting.....	9
3. Audit findings.....	10
3.1. Subsidence management plan.....	10
3.2. EMP and associated subplans .....	10
3.3. Subsidence monitoring program .....	11
3.4. Impact analysis and remediation .....	13
3.5. Adaptive management.....	17
3.6. Reporting.....	17
3.6.1. Status reports .....	17
3.6.2. Incident reporting.....	18
3.6.3. End of panel report .....	19
3.6.4. End of year report .....	19
3.7. Titleholder response to draft audit findings .....	19
4. Audit conclusions.....	20

# 1. Introduction

## 1.1. Background

Tahmoor Colliery is located approximately 80 kilometres south west of Sydney in the township of Tahmoor. The colliery is operated by Tahmoor Coal Pty Ltd and comprises mining leases CCL716, ML1308, ML1376, ML1539, and ML1642.

Longwall panel 31 (LW31) is a continuation of a series of 11 longwall panels that extend into the Tahmoor North lease area (comprising CCL716, ML1376 and ML1539) that commenced with LW22 and ended with LW32. LW31 began extraction on 28 June 2017 and finished on 17 August 2018. LW31 was approximately 2,450 metres long and 283 metres wide rib to rib. The pillar width was approximately 39 metres rib to rib. The depth of cover varied over the panel from 450 metres to 500 metres, with a seam thickness of approximately 2.1 metres.

Several natural features were identified in the active subsidence zone of LW31. Redbank Creek flows above LW31 towards the north-east, where it joins Stonequarry Creek. Redbank Creek falls approximately 30 metres over a total length of approximately 2.3 kilometres, with an average gradient of 13 millimetres/metre. Subsidence impact monitoring undertaken by Tahmoor Coal has shown that stream bed cracking and loss of pool water holding capacity have occurred in pool and stream reaches in Redbank Creek over LW25 to LW32.

Myrtle Creek was approximately 550 metres south of LW31 and was not undermined by that panel.

As part of the compliance audit program undertaken by the NSW Resources Regulator, an audit of subsidence management activities associated with the Tahmoor Colliery was undertaken on 25 February 2020.

## 1.2. Audit objectives

The objectives of the audit were to:

- Undertake a compliance audit of the Tahmoor Colliery, operated by Tahmoor Coal Pty Ltd, against the requirements of the *Mining Act 1992*, the conditions of the mining leases and associated subsidence management approvals issued pursuant to that Act, in relation to the management of subsidence impacts.

- Assess the operational performance of the mining operations in relation to subsidence management and the ability of the titleholder and/or operator to implement adaptive management and controls to provide for sustainable management of the operations.

### 1.3. Audit scope

The scope of the audit included:

- the Tahmoor Colliery mining operations and the areas above the longwall panels focussing on Longwall Panel 31 (LW31) within CCL716, ML1376 and ML1539
- a review of documents and records pertaining to the mining, subsidence management and rehabilitation activities associated with longwall panel 31
- the assessment of compliance for the period starting 1 January 2018 and ending 25 February 2020.

### 1.4. Audit criteria

The audit criteria against which compliance was assessed included:

- relevant conditions attached to the following mining leases encompassing the extraction of LW31:
  - CCL716 granted 15 June 1990 and renewal dated 29 January 2001
  - ML1376 granted 28 August 1995, pending renewal
  - ML1539 granted 16 June 2003.
- conditions attached to the Subsidence Management Plan approval for Tahmoor Colliery Longwall 31, issued by Division of Resources and Geoscience, dated 3 May 2017, specifically Conditions 6, 9, 12, 13, 14, 15, and 16
- commitments made in the Tahmoor Colliery – Longwall 31 Subsidence Monitoring Program – Revision A, prepared by MSEC June 2017 (prepared as part of the SMP application)
- commitments made in the Tahmoor Colliery Longwall 31 Environmental Management Plan, Revision B dated 2 November 2017 (prepared as a requirement of Condition 12 of the SMP approval)

- conditions attached to the approval for the Tahmoor Colliery Longwall 31 Environmental Management Plan, issued by the (then) Division of Resources and Geoscience, dated 8 November 2017
- commitments made in Shallow Groundwater Management Plan Stage 2, dated 22 December 2017 (prepared as a requirement of Condition 13 of the SMP approval)
- Commitments made in the Tahmoor Coal Pty Ltd, Mine Operations Plan, Tahmoor Coking Coal Operations – Simec Mining, 2019-2020, Rev 1 dated 25 October 2019 including:
  - Appendix 6, Myrtle Creek CMAP: Tahmoor Underground, Corrective Management Action Plan, Version 1.0 dated 16 June 2017
  - Appendix 7, Redbank Creek CMAP: Redbank Creek, Corrective Management Action Plan, June 2019, Revision 2 dated 28 June 2019
  - Tahmoor Coal Pty Ltd Erosion and Sediment Control Plan, Redbank Creek CMAP, dated July 2019
  - Tahmoor Coal Pty Ltd Erosion and Sediment Control Plan, Myrtle Creek CMAP, dated March 2019.

## 1.5. Publishing and disclosure of information

This audit report will be published on the Regulator's website consistent with Section 365 of the *Mining Act 1992*.

This audit report may be publicly disclosed consistent with the *Government Information (Public Access) Act 2009*.

## 2. Audit methods

The audit process involved the interview of site personnel, a review of documentation and samples of records provided by the titleholder and/or operator, and a site inspection to determine the level of compliance of the operations and assess the status of the operational performance. The audit process and methodology are described in more detail in the sections below.

### 2.1. Opening meeting

The opening meeting was held onsite at the Tahmoor Colliery office on 25 February 2020. The audit team was introduced and the scope of their responsibilities was conveyed to the auditees. The objectives and scope of the audit were outlined. The methods to be used by the team to conduct the audit were explained, including interview of personnel, review of documentation, examination of records and a site inspection to assess specific compliance requirements.

### 2.2. Site interviews and inspections

#### 2.2.1. Data collection and verification

Where possible, documents and data collected during the audit process were reviewed on site. All information obtained during the audit process was verified by the audit team, where possible. For example, statements made by site personnel were verified by viewing documentation and/or site inspections where possible. Where suitable verification could not be provided, this has been identified in the audit findings as not determined.

#### 2.2.2. Site inspections

A site inspection was undertaken of the following sites over LW31:

- Myrtle Creek remediation of Pool 23 – rock bar grouting
- Myrtle Creek Pool 22
- Survey markers along Redbank Creek (e.g. marker RK37)
- Redbank Creek Weir Pool (including logger R9)
- Redbank Creek Pool 26A

- Redbank Creek logger R8
- Redbank Creek remediation site Pool 11 – rock bar grouting.

## 2.3. Closing meeting

The closing meeting was held onsite at the Tahmoor Colliery office on 25 February 2020. The objectives of this meeting were to discuss any outstanding matters, present preliminary findings and outline the process for finalising the audit report.

## 2.4. Compliance assessment definitions

The reporting of results from the compliance audit was determined based on the definitions presented below in Table 1.

Table 1 Audit assessment categories

ASSESSMENT	CRITERIA
<b>Compliance</b>	Sufficient and appropriate evidence is available to demonstrate the particular requirement has been complied with.
<b>Non-compliance</b>	<p>Clear evidence has been collected to demonstrate the particular requirement has not been complied with. There are three subcategories of non-compliance reflecting the severity and level of risk associated with the non-compliance:</p> <p><b>NC1</b> – the absence of planning or implementation of a required operational element which has the potential to result in a significant risk.</p> <p><b>NC2</b> – an isolated lapse or absence of control in the implementation of an operational element which is unlikely to result in a significant risk.</p> <p><b>NC3</b> – an administrative or reporting non-compliance which does not have a direct environmental or safety significance.</p> <p>Note: The identification of a non-compliance in this audit may or may not constitute a breach of, or offence under, the Mining Act 1992. Non-compliances identified in this audit report may be further investigated by the Regulator and regulatory actions may be undertaken.</p>
<b>Observation of concern</b>	Where an auditee may be compliant at the time of the audit but there are issues that exist that could result in the potential for future non-compliance if not addressed.



ASSESSMENT	CRITERIA
	Observation of concern was also used where an issue may not have particular compliance requirements, but which was not conducive to good management or best practice.
<b>Suggestion for improvement</b>	Where changes in processes or activities inspected or evaluated at the time of the audit could deliver improvement in relation to risk minimisation, sustainable outcomes and management practices.
<b>Not determined</b>	<p>The necessary evidence has not been collected to enable an assessment of compliance to be made within the scope of the audit.</p> <p>Reasons why the audit team could not collect the required information include:</p> <ul style="list-style-type: none"> <li>■ insufficient information on the file relating to the period covered by the audit or insufficient evidence collected to reach a conclusion</li> <li>■ the wording on the criteria (approval condition) meant that no evidence could be gathered, or it was too difficult to gather the evidence.</li> </ul> <p>A 'not determined' assessment was also made where the condition was outside of the scope of the audit.</p>
<b>Not applicable</b>	<p>The circumstances of the authorisation or title holder have changed and are no longer relevant (i.e. no longer mining, mining equipment and plant has been removed).</p> <p>An invoking element in the criteria was not activated within the scope of the audit.</p>

## 2.5. Reporting

Following completion of the site audit, the audit checklists were completed, and audit notes were reviewed to compile a list of outstanding matters to be noted in the audit report. This report was prepared to provide an overview of the operational performance of the site in relation to the mining operations and identify any non-compliances or observations of concern noted by the auditors during the site inspections and interviews.

The draft audit findings were forwarded to Tahmoor Coal for comment. Consideration was given to the representations made during the finalisation of the audit report as discussed in the audit findings.

## 3. Audit findings

### 3.1. Subsidence management plan

Tahmoor Coal originally submitted a subsidence management plan application in December 2014 for Longwalls 31 to 37, in accordance with the requirements of the extraction plan condition that became effective on 1 July 2014 on mining leases CCL716, ML1376 and ML1539. In December 2016, Tahmoor Coal requested approval for Longwall 31 only as part of a staged approach to future longwalls amid consideration being given by the company to closing the colliery following completion of LW30.

Subsidence management plan approval for LW31 was granted 3 May 2017, subject to 19 conditions of approval.

Extraction of LW31 commenced on 28 June 2017 and was completed on 17 August 2018. Survey and other data presented in the End of Panel Report indicates that the panel was extracted generally in accordance with the approved plan. No evidence was observed on the day of the inspection to indicate that mining of LW31 was not carried out in accordance with the approved plan.

### 3.2. EMP and associated subplans

Condition 12 of the SMP approval required the lease holder to submit an Environmental Management Plan (EMP) to the (then) Division of Resources and Geosciences prior to causing any subsidence impacts. LW31 commenced extraction on 28 June 2017.

Tahmoor Coal had previously prepared an EMP for longwalls 27 to 30 (Tahmoor Colliery Longwalls 27 to 30 Environmental Management Plan Revision D). Interim approval to use the LW27 to LW30 EMP for the start of LW31 was given:

- First 200 metres of LW31 – approval dated 26 June 2017
- 200 metres to 400 metres – approval dated 26 July 2017
- 400 metres to 800 metres – approval dated 30 August 2017.

Subsequent to the interim approvals, Tahmoor Coal prepared and submitted the Tahmoor Colliery Longwall 31 Environmental Management Plan (Rev B) dated 2 November 2017. The EMP was approved by the (then) Division of Resources and Geosciences on 8 November 2017 subject to two additional conditions.

Condition 13 of the SMP approval required the lease holder to prepare and implement a shallow groundwater hydrological investigation and monitoring plan prior to undermining Redbank Creek. Tahmoor has prepared the Shallow Groundwater Hydrological Investigation and Monitoring Plan in stages. Stage 1 of the plan provided the locations and monitoring installation requirements within the bores and was approved on 22 September 2017. 'Shallow Groundwater Management Plan Stage 2 Revision B', was submitted on 22 December 2017, while 'Longwall 31 Shallow Groundwater Management Plan Stage 3 Revision A' was submitted on 9 February 2018. Stages 2 and 3 were reviewed by the Regulator and approval for both stages granted on 5 March 2018.

Evidence was sighted during the audit to confirm that both the EMP and the Shallow Groundwater Management Plan stages have been substantially implemented. For example, several examples of visual inspection reports for Redbank Creek (EMP Section 5.3.1.3) were reviewed by the audit team, survey data (both raw data and summary reports) was available (EMP Section 5.3.1.2) and groundwater level data was available to confirm implementation of EMP Section 5.3.2.1.

### 3.3. Subsidence monitoring program

Due to changes in the work health and safety legislative regime with the introduction of the Work Health and Safety (Mines and Petroleum Sites) Act 2013, the requirement for the submission and approval of a subsidence monitoring program was not included in the SMP approval for LW31. Despite not being a requirement of the SMP approval, Tahmoor Coal prepared the Tahmoor Colliery – Longwall 31 Subsidence Monitoring Program – Revision A which described the inspection regimes, layout of monitoring points, parameters to be measured, monitoring methods and accuracy, timing and frequency of surveys, and recording and reporting of monitoring results.

Management of potential environmental impacts was described in Section 5 of the EMP which included several monitoring measures which were undertaken during the extraction of LW31 as described in Section 5.3 of the EMP. Evidence was available to confirm implementation of the environmental impact monitoring program as listed:

- Section 5.3.1.2 Survey – Tahmoor Coal was maintaining survey records to demonstrate implementation of the survey requirements in the EMP and in Section 2.5 of the Tahmoor Colliery Subsidence Monitoring Program. For example, survey data for the absolute 3D survey at completion of LW31 dated 20 March 2018, 3D relative survey data for Redbank Creek, and examples of survey monitoring pegs sighted during the site inspection (refer to Figure 1 and Figure 2). Survey data for LW31 was noted to be summarised in the end of panel report (refer to Figure 2.10 and Figure 2.11 in the end of panel report).

- Section 5.3.1.3 Visual inspections – weekly visual inspections were undertaken upstream, directly above LW31 and downstream in Redbank Creek. Tahmoor Coal advised that these inspections were undertaken by a consultant, GeoTerra, and examples of weekly visual inspection reports were reviewed by the audit team. Stream flow and connectivity was monitored by flow loggers – examples of flow loggers were sighted during the site inspection. A photographic record of each visual inspection was also noted to be maintained, with these photos identifying any rock bar or exposed sandstone creek bed integrity or cracking issues, any spring or seep generation, relocation or modification, and any presence or alteration of ferruginous precipitation.
- Section 5.3.1.4 Stream water level monitoring – Tahmoor Coal had installed several flow loggers in Redbank Creek to collect baseline data prior to undermining and to monitor for impacts post-mining. Data was collected by the loggers daily and downloaded monthly by the Tahmoor environmental team. Loggers R8 and R9 were inspected by the audit team during the site inspection (refer to Figure 3 and Figure 4). Stream water level data was available back to 2010 for both R8 and R9, giving a reasonable baseline from which to assess impacts.
- Section 5.3.2.1 Groundwater level and quality – data was available to confirm that open standpipe water levels and vibrating wire piezometer pressure heads at varying depths throughout the overburden were being collected monthly. Water quality results were also available to confirm that groundwater chemistry is monitored monthly.

Monitoring continued to be undertaken in accordance with the Subsidence Monitoring Program and the approved EMP.

*Figure 1 Survey marker RK37 near Redbank Creek*



*Figure 2 Survey marker near Redbank Creek*



*Figure 3 Logger R9 in Redbank Creek Weir Pool**Figure 4 Logger R8 in Redbank Creek*

### 3.4. Impact analysis and remediation

Both Redbank Creek and Myrtle Creeks have been impacted by previous underground mining at Tahmoor Colliery. In response to the impacts, notices were issued under Section 240(1)(b) of the Mining Act 1992 due to a perceived inaction by Tahmoor Coal to address the issues in a timely manner:

- December 2016 Notice – directed Tahmoor Coal to prepare corrective management action plans to address specific actions required to manage or mitigate the identified issues. Corrective Management Action Plan, Final Revision B, dated 16 June 2017, was submitted to the Regulator on 16 June 2017 and approved on 4 May 2018.
- May 2018 Notice – directed Tahmoor Coal, amongst other things, to:
  - Review and update the MOP by 31 August 2018 to incorporate the Corrective Action Management Plan, Final Revision B Version 1. The MOP was reviewed and updated, and MOP Amendment F submitted on 31 August 2018.
  - Prepare and submit for review a corrective action management plan for Redbank Creek by no later than 31 December 2018. The Redbank CMAP was prepared and initially submitted to the Regulator on 31 December 2018. It was found to be inadequate, and as a result, the May 2019 Notice was issued requiring the Redbank Creek CMAP to be updated to address a range of issues.
  - Review and update the MOP by 31 July 2019 to incorporate the Redbank Creek CMAP. In conjunction with the requirements of the May 2019 Notice, the Redbank

Creek CMAP was prepared, updated and resubmitted as MOP amendment H, on 31 July 2019, and approved by the Regulator on 5 September 2019.

- May 2019 Notice – directed Tahmoor Coal to update the Redbank Creek Corrective Management Action Plan to address the items listed in the Notice. In conjunction with the requirements of the May 2018 Notice, the Redbank Creek CMAP was updated and resubmitted as MOP amendment H on 31 July 2019 which was approved by the Regulator on 5 September 2019.

Tahmoor Coal prepared and submitted a revised MOP on 25 October 2019 which incorporated both the Myrtle Creek and Redbank Creek CMAPs. This revised MOP was approved by the Regulator on 30 October 2019, and is the current MOP for the site, with approval until 30 September 2020. The remediation works proposed for both creeks included:

- pool mapping
- characterisation studies, including drilling
- grout curtain wall sites
- pool remediation sites.

Evidence was available to confirm that pool mapping and characterisation studies have been completed for both Myrtle Creek and Redbank Creek. For example, the audit team reviewed examples of the digital photogrammetry and surveying of Redbank Creek. Generally, the pool mapping and characterisation works for Myrtle Creek were completed in accordance with the timelines outlined in the CMAP. Works for the remediation of Pools 1 to 3 in Redbank Creek were not completed within the timeframes outlined in the Redbank Creek CMAP, but works were complete for Pools 1 and 2 at the time of the audit. The failure to meet the CMAP timeframes for remediation of Pools 1 to 3 in Redbank Creek is currently under investigation by the Regulator.

The grout curtain wall sites and the pool remediation works have commenced. Remediation works began with a trial rehabilitation site at Pool 23 in Myrtle Creek. Although Myrtle Creek was not impacted by the progression of LW31, the Myrtle Creek trial site was inspected during the audit as an example of the remediation works that were being progressed in Redbank Creek.

The works at Myrtle Creek pool 23 involved rock coring to a nominal depth of 20 metres and geophysical and geotechnical testing of the rock core and boreholes to characterise the fracture network. Following this, poly-urethane grouting was injected to seal the fracture network to restore the creek and catchment yield. The completion criteria for the trial remediation included a reduction in pool water level recession rates, measurement of the extent of fracture infilling and a measurement in reduction in

rock mass permeability. Figure 5, Figure 6, and Figure 7 show the Myrtle Creek Pool 23 trial site which appears to have been successful in restoring pool water levels but ongoing monitoring will be required to confirm this.

Figure 5 Rock bar drilling at Pool 23 in Myrtle Creek



Figure 6 Myrtle Creek Pool 23 rock bar with water flow



Figure 7 Myrtle Creek Pool 23 looking towards remediated rock bar



Following completion of the Myrtle Creek trial site, Tahmoor Coal progressed to a site at Pool 11 in Redbank Creek, where similar remediation by rock bar grouting will take place. This site was also inspected during the audit, although works were only in the initial setup stages. Works are being

undertaken by Pointe Engineering. Figure 8 and Figure 9 show the work site at Pool 11 in Redbank Creek.

*Figure 8 Redbank Creek Pool 11 rock bar*



*Figure 9 Redbank Creek Pool 11 upstream of rock bar*



During the site inspection, impacted areas of Redbank Creek upstream of the Weir Pool to logger R8, were inspected. Typical subsidence induced impacts in this area are shown in Figure 10 and Figure 11.

*Figure 10 Cracking in creek bed at edge of LW31 near logger R9*



*Figure 11 Loss of water in Redbank Creek weir pool*





Given that works in Pool 23 at Myrtle Creek had been completed and works in Pool 11 at Redbank Creek were only in the initial set up stages, verification of the controls outlined in the Redbank Creek and Myrtle Creek Erosion and Sediment Control Plans could not be undertaken at the time of the audit.

Tahmoor Coal has been reporting the progress and results of the stream remediation works in a series of corrective management action plan newsletters (i.e Myrtle Creek Newsletter #9 issued January 2020, and Redbank Creek Newsletter #2 issued January 2020). These were noted to be available on the SIMEC Group website.

### 3.5. Adaptive management

Tahmoor Coal has implemented an adaptive management approach to subsidence management. Based on an analysis of subsidence data and impacts from previous panels, including LW31, Tahmoor Coal has amended the number and layout of future panels. For example, the original SMP application for panels LW31 to LW37 included five panels, LW33 to LW37 to the west of LW31 and LW32. Following impacts to Redbank Creek and Myrtle Creek after LW27-LW32, this layout was amended to reduce the number of panels by one, shortening the panels to avoid undermining key rock bars, and changing the alignment of the panels to reduce the undermining of Cedar Creek, Matthews Creek and Stone Quarry Creek.

Tahmoor Coal is not within the declared catchment special areas of the Greater Sydney Water catchment, under the Water NSW Regulation 2013, and has not been involved with the Independent Expert Panel for Mining in the Catchment. Part 2 of the final report of the independent expert panel has some recommendations that may be applicable to underground mines outside of the Special Areas. As **suggestion for improvement no. 1**, it is suggested that Tahmoor Coal review the recommendations from the independent expert panel report to determine if any of the recommendations may be applicable to the Tahmoor operations.

### 3.6. Reporting

#### 3.6.1. Status reports

Condition 15 of the SMP approval for LW31 requires the lease holder to prepare and maintain a subsidence management status report which must be updated at least every 14 days. The status report must be provided to the Regulator upon request.

Evidence was available to confirm that Tahmoor Coal had prepared and maintained status reports during the extraction of LW31. For example, during the audit, examples of status reports were reviewed by the audit team including:

- Period 14 June 2018 to 28 June 2018
- Period 28 June 2018 to 12 July 2018.

A review of the report examples confirmed that details required to be addressed under Condition 15 of the SMP approval are being maintained as required.

### 3.6.2. Incident reporting

Condition 14 of the SMP approval requires Tahmoor Coal to report any significant unpredicted and/or higher than predicted subsidence impacts, including any exceedance of predicted impacts on groundwater resources and/or the natural environment. There were 10 incident and ongoing management reporting notifications for LW31 as documented in Table 11 in Section 15.5 of the Tahmoor Colliery 2018 Annual Review. Three of these notifications related to environmental impacts associated with the draining of pools or decreasing pool water levels.

In addition, the approved Tahmoor Colliery Longwall 31 Environmental Management Plan includes a trigger action response plan (TARP) in Section 5.4 that details the monitoring and other actions (including reporting) required when certain triggers are reached.

The TARP was triggered during the extraction of LW31. Two of these triggers were for impacts to bedrock involving re-direction of surface water flows and/or pool level or flow decline which was detected at several locations during routine visual monitoring. The third trigger was for impacts to groundwater levels being greater than a 10-metre water level reduction for more than two months. Subsidence impact reports were submitted as required for each event as evidenced by records in the Regulator's systems. For example:

- On 20 March 2018, Tahmoor Coal submitted a report advising impacts to bedrock with pool level flow decline at five pools within Redbank Creek (CM9 Ref: DOC18/400277/DOI). A corrective management action plan (CMAP) had already been prepared for Redbank Creek, and Tahmoor were proposing to address impacts from LW31 as part of the Redbank Creek CMAP.
- On 12 April 2018, Tahmoor Coal advised of the early stages of a significant water level reduction identified in piezometer P9 in Redbank Creek. As a result, height of fracturing drilling was completed to determine the level of connectivity between the seam and the surface. The results showed there was minimal connectivity.

### 3.6.3. End of panel report

An end of panel report was not specifically required by the SMP approval for LW31 dated April 2017. However, it was noted that Tahmoor Coal had prepared end of panel reports for LW31 as listed below:

- SIMEC Mining, Tahmoor Coking Coal Operations – Longwall 31: End of Panel Subsidence Monitoring Report for Longwall 31, prepared by MSEC and dated March 2019
- Tahmoor Colliery, Longwall 31 Surface Water, Dams and Groundwater: End of Panel Monitoring Report, prepared by GeoTerra Pty Ltd and dated March 2019
- Ecology End of Panel Report, Tahmoor Longwall 31, prepared by Niche Environment & Heritage and dated March 2019
- Tahmoor Colliery Longwall 31 End of Panel Reporting: Heritage review and reporting, prepared by Niche Environment & Heritage and dated March 2019.

Each of these reports were provided as appendices to the Tahmoor Coal Annual Review / Annual Environmental Management Report 2018 which was submitted to the Regulator in March 2019.

### 3.6.4. End of year report

Mine subsidence was observed to be included in the 2018 AEMR. Copies of the LW31 End of Panel Reports were also included as appendices to the AEMR.

Generally, the details required by the condition were noted to be included in the information provided in the AEMR.

## 3.7. Titleholder response to draft audit findings

Tahmoor Coal was provided with a copy of the draft audit report and invited to submit a response to the draft audit findings. In an email received by the Regulator, Tahmoor Coal advised that it had no specific comments on the draft report.

## 4. Audit conclusions

From the evidence reviewed during the audit, and observations made on site during the audit site inspections, it was concluded that Tahmoor Coal Pty Ltd has achieved a high level of compliance with the requirements of the SMP approval and environmental management plans associated with the management of subsidence impacts at the Tahmoor Colliery.

Notices under Section 240(1)(b) have been issued in the last two years for the site to progress the corrective management action plans for Myrtle Creek and Redbank Creek. Evidence was available during the audit to indicate that corrective management actions are progressing, for example practical completion of rock bar grouting trial at Myrtle Creek Pool 23, and rock bar grouting commencing at Redbank Creek Pool 11. Further follow-up inspections will be undertaken by the Regulator to assess progress of the approved corrective management action plans.

No non-compliances were identified for the subsidence management activities subject to audit. One suggestion for improvement was noted by the auditor as summarised below.

*Table 2 Summary of suggestions for improvement*

SUGGESTIONS FOR IMPROVEMENT	DESCRIPTION OF ISSUE
1	Tahmoor Coal is not within the declared catchment special areas of the Greater Sydney Water catchment under the Water NSW Regulation 2013 and has not been involved with the Independent Expert Panel for Mining in the Catchment. Part 2 of the final report of the independent expert panel has some recommendations that may be applicable to underground mines outside of the Special Areas. As <b>suggestion for improvement no. 1</b> , it is suggested that Tahmoor Coal review the recommendations from the independent expert panel report to determine if any of the recommendations may be applicable to the Tahmoor operations.