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## Tahmoor Coal Pty Ltd

# EXTRACTION PLAN

## Tahmoor North - Western Domain
## Longwalls West 3 and West 4

## Volume 1

## August 2021

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Document Control

| | |
|---|---|
| **APPLICANT:** | Tahmoor Coal Pty Ltd |
| **MINE:** | Tahmoor Coal Mine |
| **DEVELOPMENT APPROVAL:** | DA 57/93 (as modified) and DA 67/98 (as modified) |
| **MINING LEASES:** | ML 1376 and ML 1539 |
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# 1 Introduction

## 1.1 Background

Tahmoor Coal Mine (Tahmoor Mine) is an underground coal mine located approximately 80 kilometres (km) south-west of Sydney between the towns of Tahmoor and Bargo, New South Wales (NSW) (refer to **Figure 1-1**). Tahmoor Mine produces up to three million tonnes of Run of Mine (ROM) coal per annum from the Bulli Coal Seam. Tahmoor Mine produces a primary hard coking coal product and a secondary higher ash coking coal product that are used predominantly for coke manufacture for steel production. Product coal is transported via rail to Port Kembla and Newcastle for Australian domestic customers and export customers.

Tahmoor Mine has been operated by Tahmoor Coal Pty Ltd (Tahmoor Coal) since Tahmoor Mine commenced in 1979 using bord and pillar mining methods, and via longwall mining methods since 1987. Tahmoor Coal is a wholly owned entity within the SIMEC Mining Division of the GFG Alliance group.

Tahmoor Coal has previously mined 34 longwalls to the north and west of Tahmoor Mine's current pit top location (refer to **Figure 1-2**). The current mining area, the 'Western Domain', is located north-west of the Main Southern Railway (MSR) between the townships of Thirlmere and Picton. The Western Domain is within the Tahmoor North mining area and is within Mining Lease (ML) 1376 and ML 1539 (refer to **Figure 1-2**).

The mine plan for the Western Domain includes four longwalls - Longwalls West 1 to West 4. An Extraction Plan for the first two longwalls in the Western Domain, Longwalls West 1 and West 2 (LW W1-W2), was approved by the NSW Department of Planning, Industry and Environment (DPIE) on 8 November 2019. Longwall West 1 (LW W1) extraction was completed on 6 November 2020, and the extraction of Longwall West 2 (LW W2) was completed on 17 June 2021.

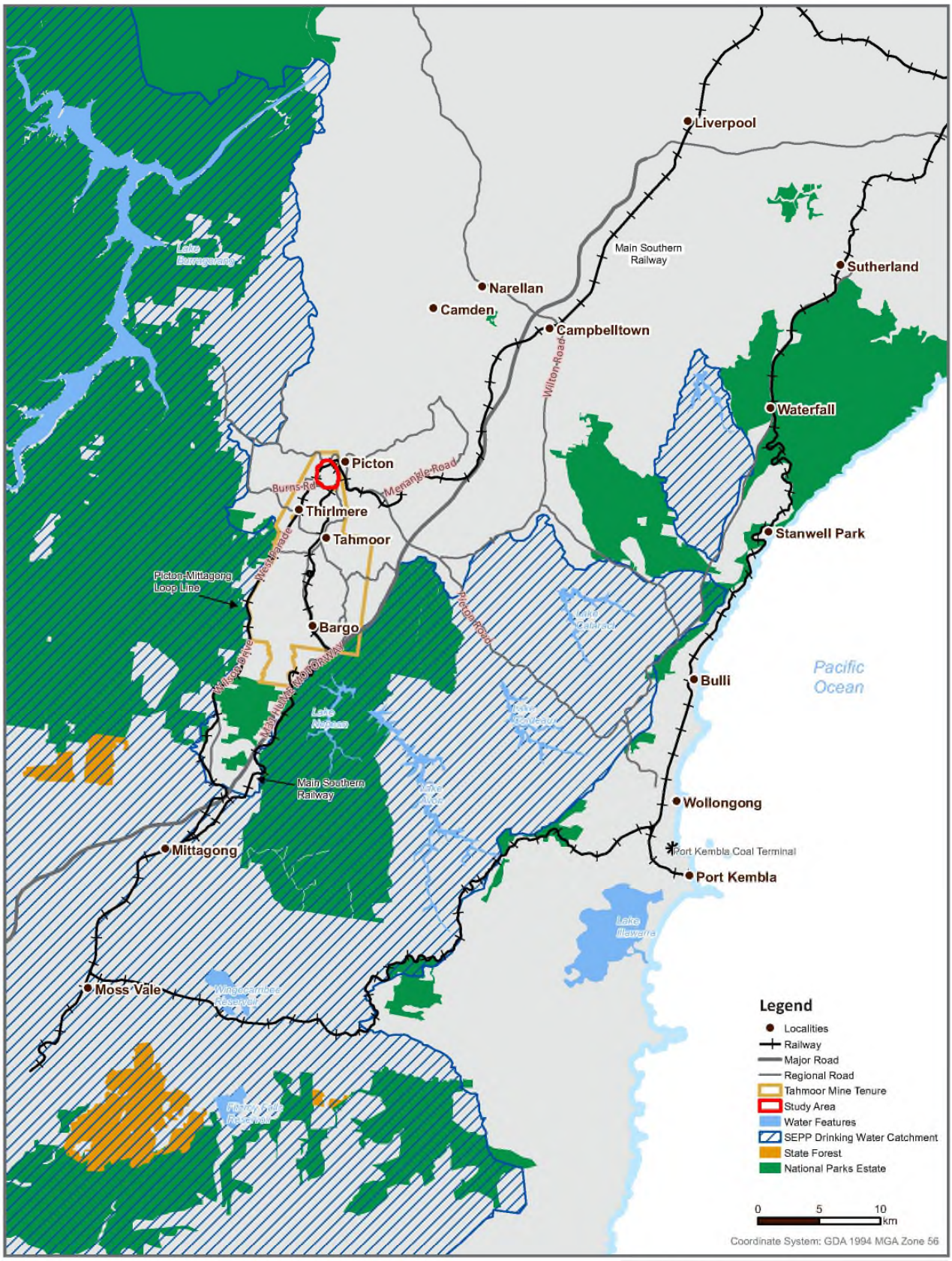
Longwalls West 3 and West 4 (LW W3-W4) are an extension of LW W1-W2 and will be the focus of this Extraction Plan.

Tahmoor Mine operates in the Tahmoor North mining area under the following Development Consents:

- DA 57/93 granted on 7 September 1994 by the Land and Environment Court of New South Wales under Section 77(3)(d) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The development application was supported by an Environmental Impact Statement (EIS) titled *Tahmoor North Coal Project* (Kembla Coal and Coke, 1993) for the extension of mining operations to the north of the then mined area. Under DA 57/93, mining was prohibited in some areas within the application area, including areas under urban land and rail lines. DA 57/93 has since been modified on one occasion relating to modification for heritage approval condition (Mod 1); and
- DA 67/98 granted on 25 February 1999 by the then Minister for Urban Affairs and Planning under Section 101(8) of the EP&A Act. The development application was supported by an EIS titled *Tahmoor North Underground Extension* (Olsen Environmental Consulting, 1998) to mine the majority of those areas of Tahmoor North that were excluded from DA 57/93. DA 67/98 has since been modified on five occasions relating to modification for:
  - Additional areas to be subsided and heritage approval condition (Mod 1);
  - Modification for Redbank Tunnel subsidence management (Mod 2);

- Modification for the subdivision of land relating to the Redbank Tunnel Rail Deviation (Mod 3);
- Modification to allow subsidence to occur within an area where subsidence was not permitted (area comprised of residential dwellings and Picton High School) (Mod 4); and
- Modification to allow subsidence to occur within an area where subsidence was not permitted (area within the MSR and Picton-Mittagong Loop Line (PMLL) rail corridors (Mod 5).

The five modifications to DA 67/98 were made in order to maintain the relevance of the approval conditions to changes in legislation and policy, industry practice, as well as environmental and community values. In September 2018, additional conditions (13A to 13J) were added to DA 67/98 to make provision to report on and measure the impacts of subsidence on natural, built and heritage features in the landscape. Under condition 13H of this modified section is the requirement to prepare an Extraction Plan for all longwalls after and including Longwall 33 (referred to here as LW W1).




# REGIONAL CONTEXT

Tahmoor North Western Domain Longwalls West 3 and West 4 Extraction Plan

*FIGURE 1-1*

Date: 22/12/2020

Data Sources:
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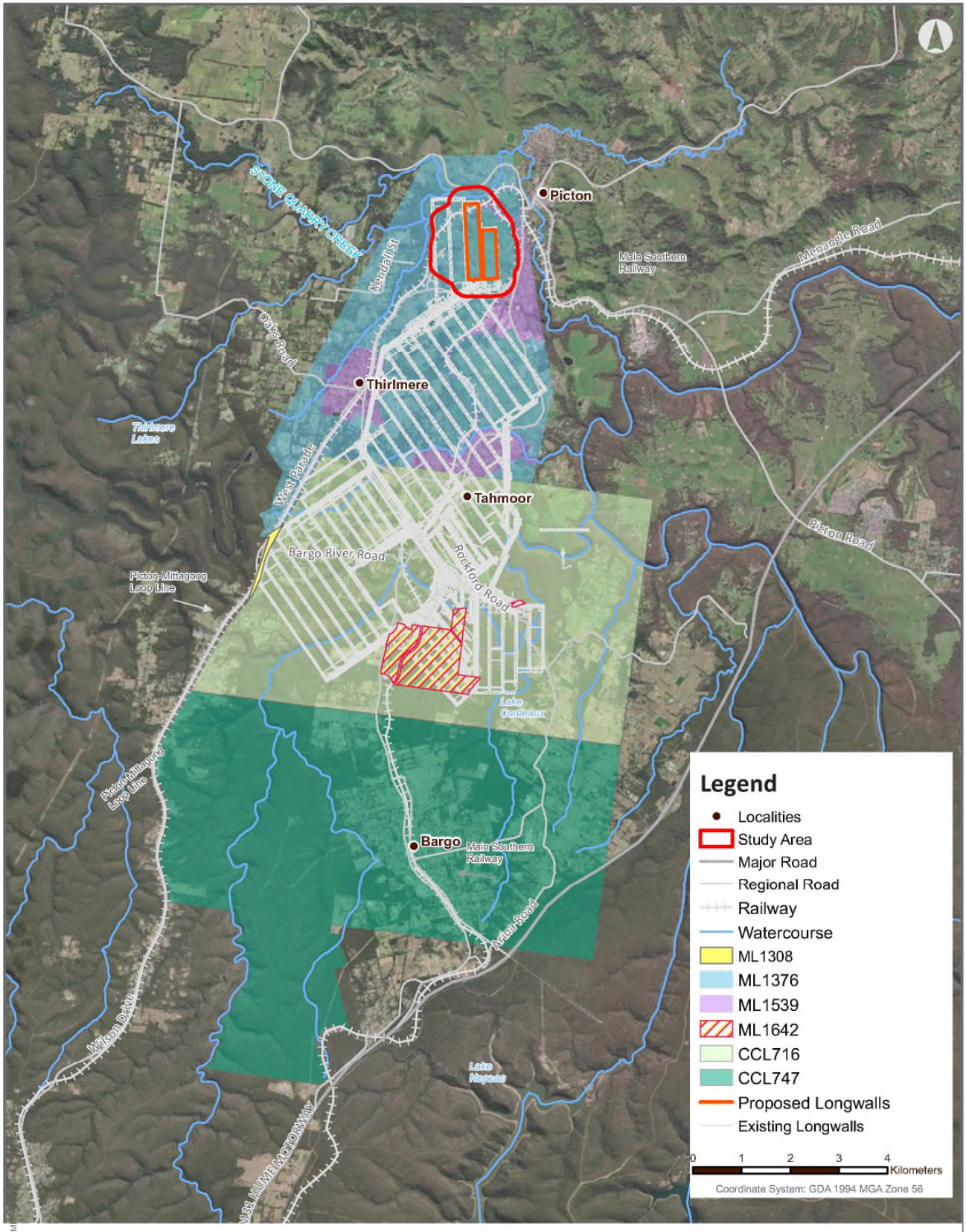


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## Tahmoor Mining Area and Tenure

Tahmoor North Western Domain Longwalls West 3 and West 4 Extraction Plan

*FIGURE 1-2*

Date: 7/04/2021

Data Sources:
© NSW DFSI (2019); © NSW Mining (2019); © SIMEC (2019)
Aerial Imagery: © Photomapping Services (November 2018)

## 1.2 Purpose

This Extraction Plan has been prepared to seek approval for secondary extraction of coal from LW W3-W4. This Extraction Plan has been prepared in accordance with the Development Consent DA 57/93 (as modified) and DA 67/98 (as modified). Specifically, Condition 13H of DA 67/98 requires an Extraction Plan approval for any second workings. This Extraction Plan has been prepared to also comply with the requirements of the relevant ML 1376 and ML 1539 issued under the *Mining Act 1992*.

This Extraction Plan and related documents have been prepared generally in accordance with DPIE's *Draft Guidelines for the Preparation of Extraction Plans V5* (DPE, 2015). Additionally, the Public Safety Management Plan (PSMP) has also been prepared to address the requirements of the *Work Health and Safety Regulation 2017 (*WHS Regulation) and *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (*WHSMP Regulation), and the NSW Resources Regulator's *Managing Risks of Subsidence Guide: WHS (Mines and Petroleum Sites) Legislation* (Department of Industry – Resources Regulator, 2017).

A compliance register showing how the Extraction Plan complies with the relevant approvals, legislation and guidelines has been included in **Section 3.2** of this Extraction Plan.

The key purpose of this Extraction Plan is to outline the monitoring and management measures to be implemented to manage potential subsidence related impacts ensure the protection of all surface / subsurface natural and built features and the protection of public safety within the Extraction Plan Study Area during extraction of LW W3-W4. This Study Area is defined in **Section 3.1**.

Full details of the proposed monitoring and management measures are provided in the supporting component management plans for the Extraction Plan, as provided in Volumes 2 to 4, and outlined in **Section 4** of this document. The document structure for this Extraction Plan is outlined in **Section 1.4**.

## 1.3 Scope

The Study Area applicable to this Extraction Plan is defined in **Section 3.1**.

This Extraction Plan Main Document has the following structure:

- **Section 1** Introduction - This section provides background to the Extraction Plan, the purpose and scope of this Extraction Plan Main Document, and the document structure of the Extraction Plan;
- **Section 2** Development - This section outlines stakeholders consulted as part of the preparation of this Extraction Plan, outlines the process of updating subsidence predictions, and outlines the Extraction Plan team;
- **Section 3** Overview - This section provides an introduction to the LW W3-W4 Extraction Plan:
  - Describes the Study Area covered by the Extraction Plan and the environmental and built features in the Study Area;
  - Addresses specific requirements set by DA 67/98 Condition 13H, including detailed performance indicators for subsidence performance measures;
  - Addresses Work Health and Safety legislation specifically in relation to subsidence as a principal mining hazard in relation to the safety of 'other persons';
  - Addresses other regulatory requirements, approvals, leases, licences and guidelines relevant to the preparation of the Extraction Plan;

- Describes all key proposed and existing mining parameters, and any special features;
- Outlines potential subsidence effects, subsidence impacts and environmental consequences of LW W3-W4;
- Describes the subsidence management measures that will be implemented to ensure compliance;
- Outlines the adaptive management approach and contingency plans in the event of exceedances of performance measures and predicted environmental consequences;

- **Section 4** Key Component Plans - This section outlines the individual management plans intended to manage particular environmental or built features within the Extraction Plan Study Area;
- **Section 5** Subsidence Monitoring Program - This section details the subsidence monitoring program for potential subsidence impacts and environmental consequences;
- **Section 6** Implementation - This section describes the key elements of implementation, including reporting requirements, reviews and key responsibilities;
- **Section 7** Graphical Plans - This section lists the graphical plans that have been prepared for the LW W3-W4 Extraction Plan Study Area, which include detailed mine plans of LW W3-W4; and
- **Section 8** Document Information - This section provides a compiled list of references, related documents, terms, and abbreviations used in this document. In addition, this section provides the change information for this document, and a summary of the distribution of this document to stakeholders.

## 1.4 Document Structure

This Extraction Plan for LW W3-W4 comprises five volumes as outlined in **Table 1-1**. These essentially comprise a main text document, supporting management plans, graphical plans, and technical studies.

**Table 1-1 Extraction Plan Structure**

| Volume | Contents |
|---|---|
| Volume 1 | Extraction Plan Main Report (this document)<br>Appendices related to Main Report (refer to Table of Contents) |
| Volume 2 | Key Component Plans:<br>• Water Management Plan:<br>- Surface Water Technical Report;<br>- Flood Impact Study;<br>- Groundwater Technical Report;<br>- Baseline Private Bore Assessment;<br>• Land Management Plan:<br>- Geotechnical Assessment; and<br>- Land and Agricultural Resource Assessment. |
| Volume 3 | Key Component Plans (continued):<br>• Biodiversity Management Plan:<br>- Aquatic Biodiversity Technical Report; and<br>- Terrestrial Biodiversity Technical Report.<br>• Heritage Management Plan:<br>- Aboriginal Heritage Technical Report; and<br>- Historical Heritage Technical Report.<br>• Stonequarry Creek Rockbar Management Plan |

| | |
|---|---|
| Volume 4 | Key Component Plans (continued):<br>• Built Features Management Plan;<br>• Public Safety Management Plan; and<br>• Subsidence Monitoring Program. |
| Volume 5 | AO Graphical Plans |

# 2 Extraction Plan Development

## 2.1 Stakeholder Identification and Engagement

Tahmoor Coal has a long history of successful two-way engagement with the local community in which it operates, striving to sustain positive relationships through a process of ongoing consultation and interaction.

A number of consultation mechanisms are utilised throughout each phase of mining for current and future mining (including LW W3-W4, past mining areas, future mining areas, exploration activities, and general enquiries). These consultation mechanisms include:

- Written correspondence (e.g. Resident Information Packs, letters, newsletters, emails);
- Display of newsletters at local shopping centre;
- Publication of information on the Tahmoor Coal Website;
- Provision of information at the Tahmoor Colliery Community Consultative Committee (TCCCC) (quarterly meetings);
- Meetings (face to face or phone);
- Door knocks;
- Periodic Community Information Sessions;
- 24hr call line for enquiries; and
- Provision of contact details for Tahmoor Coal Representatives.

This section provides an overview of the stakeholder engagement process with government agencies and the community, the various engagement activities undertaken, a summary of findings from these activities, and references to where these findings have been incorporated and addressed in this Extraction Plan.

### 2.1.1 Identification of Key Stakeholders

Consultation has been completed in accordance with DA 67/98 Condition 13H, which outlines relevant stakeholders to be consulted in the development of the Extraction Plan and key component plans. The purpose of this consultation was to provide stakeholders with an overview of the proposed development and to seek input during the development of key component plans and other documents prepared in support of the LW W3-W4 Extraction Plan described in **Section 4** of this document.

**Table 2-1** provides an overview of stakeholders that have been consulted with during the preparation of this Extraction Plan primarily in accordance with the consultation requirements of DA 67/98.

**Table 2-1 Stakeholders Consulted during the preparation of the LW W3-W4 Extraction Plan**

| DA 67/98 Condition | Component | DA 67/98 Consultation Requirements | Additional Stakeholders Consulted |
|---|---|---|---|
| Condition 13H(ii) | Preparation of Extraction Plan | • Department of Regional NSW - Resources Regulator (Resources Regulator) (Subsidence and Mining Act Inspectorate)<br>• DPIE - Environment, Energy and Science (EES) Group<br>• Dams Safety Committee (DSC) – Dams Safety NSW<br>• WaterNSW<br>• DPIE – Water (DPIE Water)<br>• DPIE - Crown Lands Division (Crown Lands) | • DPIE (Resource Assessments)<br>• Subsidence Advisory NSW (SA NSW)<br>• Department of Regional NSW – Mining Exploration and Geoscience (MEG) |
| Condition 13H(iv) | Consultation for the development of the mine design | • Resources Regulator | - |
| Condition 13H(vii)(a) | Preparation of Subsidence Monitoring Program | • Resources Regulator | - |
| Condition 13H(vii)(b) | Preparation of Built Features Management Plan | • Resources Regulator<br>• Australian Rail Track Corporation (ARTC)<br>• NSW Office of the National Rail Safety Regulator (NRSR)<br>• Relevant infrastructure owners<br>• Landowners | • Wollondilly Shire Council (WSC)<br>• Transport for NSW (TfNSW)<br>• Transport Asset Holding Entity (Formerly RailCorp) |
| Condition 13H(vii)(c) | Preparation of Water Management Plan | • NSW Environment Protection Authority (EPA)<br>• DPIE Water<br>• Resources Regulator<br>• WaterNSW | • NSW Industry – Land & Water – Natural Resources Access Regulator – East (NRAR)<br>• EES<br>• DSC |
| | Preparation of Flood Management Protocol | • WSC<br>• NSW State Emergency Services (SES)<br>• Landowners | - |
| Condition 13H(vii)(d) | Preparation of Biodiversity Management Plan | • EES | - |
| Condition 13H(vii)(e) | Preparation of Land Management Plan | • Affected public authorities | • NSW Department of Primary Industries – Agriculture (DPI Agriculture)<br>• DPIE Crown Lands |

| DA 67/98 Condition | Component | DA 67/98 Consultation Requirements | Additional Stakeholders Consulted |
|---|---|---|---|
| Condition 13H(vii)(f) | Preparation of Heritage Management Plan and Stonequarry Creek Rockbar Management Plan | • Heritage NSW<br>• Relevant stakeholders for heritage items | • Registered Aboriginal Parties (RAPs)<br>• EES |
| Condition 13H(vii)(g) | Preparation of Public Safety Management Plan | • Resources Regulator | - |
| Condition 13I | Approval of Extraction Plan | • DPIE (Resource Assessments) | - |

In addition, consultation with the following stakeholders was also undertaken

- Resource Regulator in accordance with WHS legislation;
- SA NSW as required for:
  - Pre-mining dwelling inspections and condition reports;
  - Remediation of subsidence impacts to improvements and infrastructure; and
- TCCCC, in accordance with DA 67/98 Condition 47.

### 2.1.2 Results and Outcomes of Consultation

Stakeholder engagement has been undertaken with local and State Governments, industry regulators, the local Aboriginal community, affected landowners, and the wider local community during the preparation of this Extraction Plan.

A summary of consultation completed to date during the preparation of this Extraction Plan is provided in **Table 2-2**. Due to COVID-19 restrictions, all stakeholders identified in **Table 2-1** were consulted via letter as face to face meetings were not possible. For key stakeholders, teleconference meetings were offered in the letter of consultation.

Following the preparation of draft management plans for the various infrastructure in the Study Area, infrastructure owners with infrastructure located in or near the Study Area will be consulted to review and endorse the relevant Infrastructure Management Plans that outline the management of their infrastructure during LW W3-W4 extraction. Tahmoor Coal has completed such consultation with infrastructure owners as part of previous longwalls and has well-established relationships with infrastructure owners in the local area, who are familiar with the process and structure of the management plans.

The following infrastructure owners will be consulted regarding the corresponding infrastructure Management Plans:

- Endeavour Energy – Endeavour Energy Management Plan for electrical infrastructure;
- Jemena – Jemena Management Plan for gas infrastructure;
- Sydney Water:
  - Sydney Water Potable Water Management Plan for potable water infrastructure;
  - Sydney Water Sewer Management Plan for sewer infrastructure;
- Bradcorp – Stonequarry Sewer Management Plan for the Stonequarry Sewerage Treatment Plant.

- Telstra – Telstra Management Plan for telecommunications infrastructure managed by Telstra;
- NBNCo – NBN Management Plan for telecommunications infrastructure managed by NBN;
- Australian Rail Track Corporation (ARTC) (Main Southern Railway) – Main Southern Railway Management Plan for Main Southern Railway infrastructure;
- Transport Asset Holding Entity and Transport Heritage NSW (Picton-Mittagong Loop Line) – Picton-Mittagong Railway Management Plan for Picton-Mittagong Loop Line infrastructure;
- TfNSW – Transport for NSW Management Plan for state roads and associated infrastructure;
- Wollondilly Shire Council (WSC):
  - Wollondilly Shire Council Management Plan for local roads, culverts and bridges; and
  - Weatherboard Cottage Management Plan for the heritage-listed Weatherboard Cottage.

In addition, a Built Structures Management Plan will be prepared for the management of privately-owned built structures in the Study Area.

**Table 2-2 Summary of Key Issues Raised and Outcomes of Consultation Undertaken for LW W3-W4 Extraction Plan**

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
|---|---|---|---|---|---|
| **Government Agencies** | | | | | |
| NSW Department of Planning, Industry and Environment (DPIE) – Resource Assessments | 14/09/2020 | Letter via email | A letter was sent to DPIE Resource Assessments (addressed to Stephen O'Donoghue) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | No response has been received.<br>The LW W3-W4 Extraction Plan was discussed at the meeting held on 23/09/2020. | Noted. |
| | 23/09/2020 | Meeting | A meeting was held between representatives of DPIE Resource Assessments (Stephen O'Donoghue and Gen Lucas) and Tahmoor Coal via teleconference.<br>The meeting was an opportunity to outline the proposed LW W3-W4 Extraction Plan, the key features in the LW W3-W4 Study Area to be monitored, and stakeholder consultation currently in progress.<br>Tahmoor Coal provided an overview of the western domain, discussed current LW progress and the expected start date of LW3 (Aug 2021) and W4 (Jun 2022). | DPIE requested valley closure data for LW W3-W4. | Tahmoor Coal provided a copy of the presentation and valley closure data for LW W3-W4 via email on 24/09/2020. |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
|---|---|---|---|---|---|
| | | | Tahmoor Coal also review predicted subsidence and current status of consultation with key stakeholders. | | |
| | 7/09/2020 | Letter via email | A letter seeking approval of suitably qualified and experienced persons to prepare the Extraction Plan was sent to DPIE Resource Assessments (addressed to Stephen O'Donoghue). | Approval of suitably qualified and experienced persons to prepare the Extraction Plan was received from DPIE on 14/09/2020. | Noted. |
| NSW Department of Planning, Industry and Environment – Environment, Energy and Science (EES) Group | 16/09/2020 | Letter via email | A letter was sent to EES (addressed to Liza Schaeper) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | An email response was received from EES (Liza Schaeper) on 21/09/2020 with a list of data requests. | Tahmoor Coal provided the requested data on 25/09/2020 and 15/01/2021. |
| | | | | A letter response was received from EES (Liza Schaeper) on 29/01/2021 with preliminary comments and further information requests. These are outlined below. | Noted. |
| | | | | EES noted that their primary concern relates to subsidence impacts to watercourses including an appropriate water monitoring program and remediation plans that have appropriate measures and objectives to assess remediation success. | Noted.<br>Potential subsidence impacts on watercourses are discussed in Section 4 of the WMP.<br>Proposed monitoring, mitigation and management strategies are presented in Sections 5 and 6 of the WMP. |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
|---|---|---|---|---|---|
| | | | | | Tahmoor Coal will complete further consultation with EES following the submission of the Extraction Plan documents to DPIE. |
| | | | | The subsidence assessment provided is in a draft form and lacks detailed scientific methods or evidence to demonstrate remediation success to date for impacts to Myrtle and Redbank Creeks, or remediation plans for future potential impacts to Matthews, Cedar and Stonequarry Creeks (if they occur). | A summary of remediation success to date has been included in the Subsidence Predictions and Impact Assessment Report (Appendix A).<br><br>Details of remediation to date at Myrtle Creek is provided in the Myrtle Creek Rehabilitation Report (Appendix E).<br><br>An indicative outline for Corrective Action Management Plans (if required) to address any future potential impacts to creeks is outlined in Section 3.6.3 of this document and Section 6.2.2 of the WMP. |
| | | | | In addition, two other report are referenced, HEC 2020 and Geoterra 2020, which have not been made available for concurrent review. | All requested documents will be provided to EES following the submission of the Extraction Plan documents to DPIE. Further consultation will also be arranged with EES following submission of the Extraction Plan. |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
|---|---|---|---|---|---|
| | | | | In addition, the MSEC report has a limited review of LW32 subsidence despite impacts significantly exceeding predictions. Suggestions are made that this may in part be due to the proximity of the Nepean fault. | Detailed discussion of LW32 subsidence has been included in the Subsidence Predictions and Impact Assessment Report (Appendix A; Section 3.8). |
| | | | | This report relies on updated mapping of the Nepean fault which runs just to the east of LW W4, apparently outlined in a SCT (2020) report. | All requested documents will be provided to EES following the submission of the Extraction Plan documents to DPIE. Further consultation will also be arranged with EES following submission of the Extraction Plan.<br>Tahmoor Coal is currently completing geotechnical investigations to determine the extent of the Nepean Fault Complex in proximity to LW W3-W4. A report providing a review of the findings from this investigation will be provided to DPIE once available. |
| | | | | EES recommend the provision of a presentation and report that describes the remediation applied to Myrtle Creek and Redbank Creek and how/why it is deemed to have been a success. | Tahmoor Coal will complete further consultation with EES following the submission of the Extraction Plan documents to DPIE. This will include the provision of the Myrtle Creek Rehabilitation Report (Appendix E) and a presentation to EES regarding the progress of Myrtle |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
|---|---|---|---|---|---|
| | | | | | Creek and Redbank Creek rehabilitation. |
| NSW Department of Planning, Industry and Environment – Water (DPIE Water) | 16/09/2020 | Letter via email | A letter was sent to DPIE Water (addressed to Fabienne Boudoux d'Hautefeuille) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | An email response was received from DPIE Water on 19/11/2020 stating comments would be provided once the Extraction Plan is submitted to DPIE. If Tahmoor Coal believes there are matters to be clarified ahead of submission, DPIE Water can meet to discuss. | Noted. |
| NSW Department of Planning, Industry and Environment – Crown Lands Division (Crown Lands) | 18/09/2020 | Letter via email | A letter was sent to Crown Lands (addressed to Chris Reynolds) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | As of 30 April 2021, no response to the letter of consultation has been received from Crown Lands. | Noted. |
| Heritage NSW | 28/01/2020 | Letter via email | A letter was sent to Heritage NSW introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | As of 30 April 2021, no response to the letter of consultation has been received from Heritage NSW. | Noted. |
| Department of Regional NSW - Resources Regulator (Resources Regulator) | 22/09/2020 | Letter via email | A letter was sent to Resources Regulator (addressed to Dr Gang Li) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | Resources Regulator acknowledged the receipt of this letter on 25/09/2020. As of 30 April 2021, no comments to the letter of consultation has been received from Resources Regulator (Subsidence). | Noted. |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
|---|---|---|---|---|---|
| | 14/08/2020 | Letter via email | A letter was sent to the Resources Regulator (addressed to Ray Ramage) with information on the first workings of Tahmoor Coal Mine for LW W3-W4 as required under Condition 13G(4) of DA 67/98. | Resources Regulator noted the contents of this letter on 17/08/2020. | Noted. |
| | 10/02/2021 | Risk Review | A Risk Review for MSR infrastructure was completed in light of potential impacts resulting from the extraction of LW W3-W4.<br>The review was attended by Resources Regulator (Dr Gang Li) and NRSR (Mr Ian Cochrane). | Dr Gang Li (Resources Regulator) commented that Tahmoor Coal needs to ensure that risk controls are considered in relation to requirements of the WHS act and the Guideline for Managing Risks of Subsidence (2017). | Noted.<br>A copy of the LW W3-W4 MSR Management Plan will be provided to Resources Regulator once completed. |
| | | | | Ian Cochran (ONRSR) interested in seeing final version and copy of TARP for management plan. | Noted.<br>A copy of the LW W3-W4 MSR Management Plan will be provided to ONRSR once completed. |
| | 24/02/2021 | Risk Review | A Risk Review for PMLL infrastructure was completed in light of potential impacts resulting from the extraction of LW W3-W4.<br>The review was attended by NRSR (Mr Ian Cochrane). Resources Regulator (Dr Gang Li) was invited, however declined the invitation. | Ian Cochran (ONRSR) raised no major concerns and interested in seeing final version of the management plan. | Noted.<br>A copy of the LW W3-W4 PMLL Management Plan will be provided to ONRSR once completed. |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
|---|---|---|---|---|---|
| | 21/04/2021 | Phone call | A phone call was received from Resources Regulator requesting an update on the provision of the LW W3-W4 Subsidence Monitoring Program and High Risk Activity (HRA) Notification. | Subsidence Monitoring Program and HRA Notification are required for LW W3-W4. | The final LW W3-W4 Subsidence Monitoring Program was provided to Resources Regulator on 27 April 2021.<br>The HRA Notification for LW W3-W4 will be provided to the Resources Regulator shortly after the submission of this Extraction Plan. |
| Department of Regional NSW - Resources Regulator (Mining Act Inspectorate) | 16/09/2020 | Letter via email | A letter was sent to Resources Regulator (addressed to Greg Kininmonth) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | An email response was received from Resources Regulator on 20/11/2020 stating that the Mining Act Inspectorate has no specific comment regarding the preparation of the Extraction Plan. | Noted. |
| Department of Regional NSW – Mining Exploration and Geoscience (MEG) | 16/09/2020 | Letter via email | A letter was sent to MEG (addressed to Adam Bannister) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | As of 30 April 2021, no response to the letter of consultation has been received from MEG. | Noted. |
| NSW Infrastructure - Land & Water - Natural Resources Access Regulator (NRAR) | 16/09/2020 | Letter via email | A letter was sent to NRAR (addressed to Ellie Randall) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | An email response was received from NRAR on 19/11/2020 requesting details of water take and appropriate water licencing is included in the Water Management Plan. In addition, NRAR requests to review the Water Management Plan once prepared. | Details of water take and water licencing is included in Section 4.1.2 of the Water Management Plan.<br>A copy of the Extraction Plan will be provided to all stakeholders |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| | | | | | once prepared for review and comment. |
| | 29/03/2021 | Email | An email was sent to NRAR requesting to meet to discuss and finalise requirements for all Water Access Licences required for Tahmoor Mine. | NRAR acknowledged receipt of this email.<br>As of 30 April 2021, Tahmoor Coal is awaiting a formal response. | Noted. |
| WaterNSW | 16/09/2020 | Letter via email | A letter was sent to WaterNSW (addressed to Clay Preshaw) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | An email response was received from WaterNSW on 3/11/2020 stating that as the Study Area is located outside the Sydney Drinking Water Catchment area, WaterNSW has no comments on the project. | Noted. |
| Dams Safety Committee (Dams Safety NSW) | 17/09/2020 | Letter via email | A letter was sent to Dams Safety NSW (addressed to Chris Salkovic) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | An email response was received from Dams Safety NSW on 19/11/2020 stating that as there are no Declared Dams in the area of disturbance, Dams Safety NSW has no comments. | Noted. |
| NSW Environment Protection Authority (EPA) | 17/09/2020 | Letter via email | A letter was sent to the EPA (Andrew Couldridge) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | A response via email was received from the EPA (Andrew Couldridge) on 22 September 2020 which stated the EPA has no comments to provide on the preparation of the Extraction Plan. | Noted. |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| NSW Department of Primary Industries – Agriculture (DPI Agriculture) | 17/09/2020 | Letter via email | A letter was sent to DPI Agriculture (addressed to Wendy Goodburn) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | A letter response sent via email was received from DPI Agriculture (Mary Kovac) dated 7 October 2020. This letter provides a list of inclusions that are a guide for the development of a Land and Agricultural Resource Assessment. This list of inclusions is replicated below: | A Land and Agricultural Resource Assessment (SLR, 2021) has been prepared and includes information to address the list of inclusions in the DPI Agriculture letter. |
| | | | | Describe the current *Important Agriculture Land* on the proposed development site and surrounding locality including the land capability, and soil landscapes. We note that the site verification is previous work indicates no presence of biophysical strategic agricultural land. This work provides a baseline evaluation of the current land resource for any impact assessment. | |
| | | | | A description of the agricultural landuses in the area and associated enterprises and agricultural productivity of these again to provide a current status of agriculture in the area. | |
| | | | | Detail the expected life span of the proposed development. | |
| | | | | Consider possible cumulative effects to agricultural enterprises and | |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| | | | | landholders from subsidence / other impacting events. | |
| | | | | An assessment of the monitoring regime that will identify any changes as a result of the effects of the long wall mining, especially subsidence. This may include impacts of farm infrastructure i.e. buildings, fences, water supply infrastructure. (This may overlap with the other informing plans). | |
| | | | | Consult with the owners / managers of affected and adjoining neighbours and agricultural operations in a timely and appropriate manner about: the proposal, the likely impacts and suitable mitigation measures or compensation. | In accordance with Condition 15(ii) of DA 67/98, Tahmoor Coal have notified relevant landowners / occupiers within the 20 millimetre subsidence area and 35 degree angle of draw of the intention to extract LW W3-W4. This consultation was initiated on 15 September 2020 and included an overview of the proposal, likely subsidence impacts, and information about the services offered by Tahmoor Coal (Pre-Mining Inspections and Hazard Identification), and the subsidence claims process under the *Coal Mine Subsidence Compensation Act 2017*.<br><br>Consultation with landholders will continue through the phases of mining. |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| | | | | Establish a complaints register that includes reporting and investigating procedures and timelines, and liaison with local government in relation to complaint issues involving agriculture. | Tahmoor Coal has an established compliance register, into which complaints are registered and tracking of consequent investigative actions. In addition, Tahmoor Coal records correspondence with landowners in a database. |
| Subsidence Advisory NSW (SA NSW) | 16/09/2020 | Letter via email | A letter was sent to SA NSW (addressed to Brendan Killen) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | A letter response sent via email was received from SA NSW (Kieran Black on behalf of John Johnston) dated 8 December 2020. This letter requested a draft or final Built Features Management Plan or Subsidence Predictions and Impact Assessment Report to be provided to SA NSW for review prior to a complete assessment and response to the Extraction Plan to DPIE. | A copy of the final Subsidence Predictions and Impact Assessment Report and final BFMP will be provided to SA NSW following the submission of the Extraction Plan documents to DPIE. |
| | | | | The letter also outlined that the Built Features Management Plan should include the following:<br>• The procedures and monitoring in the proposed BFMP will allow the performance criteria set out in the consolidated consent (DA67/98 -Mod-5) for the Tahmoor North project to be met; and | The updated Infrastructure Management Plans will provide details of procedures and monitoring for each of the key public infrastructure and other infrastructure listed in DA 67/98 (Mod 5). These procedures and monitoring plans will allow the DA 67/98 (Mod 5) performance criteria to be met.<br>Infrastructure Management Plans will be updated for LW W3-W4 |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| | | | | | prior to LW W3-W4 subsidence impacts to each feature. |
| | | | | • Procedures and monitoring in the BFMP should also meet any requirements by SA NSW as outlined in the *Coal Mine Subsidence Compensation Act 2017* and SA NSW process for managing claims. | The SA NSW claims process and subsidence remediation obligations are included in the Built Features Management Plan and will be included in subsequent Infrastructure Management Plans (which will include a Built Structures Management Plan for LW W3-W4). |
| | Various (monthly) | Meetings | Ongoing monthly meetings with SA NSW occur. | SA NSW requests regular updates of progress of Western Domain longwalls and Extraction Plan, and any remediation of impacts to affected built features. | Information provided by Tahmoor Coal during meetings. Minutes available on request. |
| NSW Roads and Maritime Services (Roads and Maritime) / Transport for NSW (TfNSW) | 17/09/2020 | Letter via email | A letter was sent to Roads and Maritime (addressed to Chris Millet) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | As of 30 April 2021, no response to the letter of consultation has been received from Roads and Maritime. | Noted. |
| | 20/04/2021 | Letter via email | The Roads and Maritime letter of consultation was sent to TfNSW as no response had been received from Roads and Maritime as of 20/4/2021. | As of 30 April 2021, no response to the letter of consultation has been received from TfNSW. | Noted. |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
|---|---|---|---|---|---|
| NSW State Emergency Services (SES) | 17/09/2020 | Letter via email | A letter was sent to SES (addressed to Ngaire McCarthy) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | A response via email was received from SES (Ngaire McCarthy) on 4 December 2020 which stated that SES will provide feedback for Flood Management Plans and Procedures where required. | Noted. |
| Office of the National Rail Safety Regulator (NRSR) | 22/09/2020 | Letter via email | A letter was sent to NRSR (addressed to Ian Cochran) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | A response via email was received from the NRSR (Ian Cochran) on 3 December 2020 which stated the NRSR look forward to providing review and comments on relevant parts of the associated plans yet to be finalised. | Noted. |
| | 10/02/2021 | Risk Review | A Risk Review for MSR infrastructure was completed in light of potential impacts resulting from the extraction of LW W3-W4.<br>The review was attended by Resources Regulator (Dr Gang Li) and NRSR (Mr Ian Cochrane). | Dr Gang Li (Resources Regulator) commented that Tahmoor Coal needs to ensure that risk controls are considered in relation to requirements of the WHS act and the Guideline for Managing Risks of Subsidence (2017). | Noted.<br>A copy of the LW W3-W4 MSR Management Plan will be provided to Resources Regulator once completed. |
| | | | | Ian Cochran (ONRSR) interested in seeing final version and copy of TARP for management plan. | Noted.<br>A copy of the LW W3-W4 MSR Management Plan will be provided to ONRSR once completed. |
| | 24/02/2021 | Risk Review | A Risk Review for PMLL infrastructure was completed in light of potential impacts resulting from the extraction of LW W3-W4. | Ian Cochran (ONRSR) raised no major concerns and interested in seeing final version of the management plan. | Noted.<br>A copy of the LW W3-W4 PMLL Management Plan will be |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| | | | The review was attended by NRSR (Mr Ian Cochrane). Resources Regulator (Dr Gang Li) was invited, however declined the invitation. | | provided to ONRSR once completed. |
| Australian Rail Track Corporation (ARTC) | 1/12/2020 | Letter via email | A letter was sent to ARTC (addressed to Michael Irons) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | As of 30 April 2021, no response to the letter of consultation has been received from ARTC. | Noted. |
| **Infrastructure Owners** | | | | | |
| Wollondilly Shire Council (WSC) | 18/09/2020 | Letter via email | A letter was sent to WSC (addressed to Alexandra Stengl) introducing the Extraction Plan for LW W3-W4. Tahmoor Coal provided a figure of the Extraction Plan Study Area, and an overview of the longwalls. | A letter response sent via email was received from WSC (Alexandra Stengl) dated 13 October 2020. | Noted. |
| | | | | WSC would expect that the Extraction Plan will involve additional consultation with landowners of potentially affected dwellings and fully compensation of any impacts attributable to subsidence. | In accordance with Condition 15(ii) of DA 67/98, Tahmoor Coal have notified relevant landowners / occupiers within a 35 degree angle of draw of the intention to extract LW W3-W4. This was completed on 15 September 2020 and included a Resident Information Pack detailing the compensation process for any subsidence impacts.<br><br>Tahmoor Coal conducts regular consultation with nearby landowners / occupiers as LW W3 approaches and during the |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
|---|---|---|---|---|---|
| | | | | | extraction of LW W3-W4. This includes consultation via written communication (eg letters, newsletters) and meetings (eg. door knocks, face to face meetings, phone calls).<br><br>Tahmoor Coal will provide compensation for any subsidence related impacts as required by the *Coal Mine Subsidence Compensation Act 2017*. Tahmoor Coal will continue to provide information about mining, subsidence and compensation process in planned consultation activities. |
| | | | | WSC also requests that there is ongoing consultation regarding the management of impacts to local roads. | Tahmoor Coal will consult with WSC during the preparation of the LW W3-W4 Wollondilly Shire Council Management Plan for the management of WSC-managed roads, bridges and culverts. Tahmoor Coal will seek input from WSC, as well as approval of the plan from WSC prior to implementation.<br><br>Consultation will continue between Tahmoor Coal and WSC as required for the management of WSC-managed structures during the extraction of LW W3-W4. |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| | | | | The holding of discussions during the preparation and implementation of the Extraction Plan would be appreciated. | Further consultation will be held between Tahmoor Coal and WSC as required. |
| | | | | This letter also provided a table of issues to be addressed in the current Extraction Plan, which are detailed below. | Noted. |
| | | | | **Water Management Strategy** | |
| | | | | Modelling and data analysis to obtain an accurate scientific based assessment of the setbacks required for the longwalls to avoid impacts to third order water streams or above (in a catchment context. | The current mine plan is a revision of the 2014 SMP Application mine plan, which was reviewed based on feedback received from the community and NSW Government agencies, as well as updated knowledge on geotechnical, operational and mining conditions. The updated mine design was re-orientated to avoid mining directly under high order streams (Matthews Creek, Cedar Creek and Stonequarry Creek).<br><br>Tahmoor Coal considers that the current subsidence predictions for the current mine plan to be acceptable, and that the current mine plan appropriately balances the requirements of resource recovery, minimisation of environmental impact, and consideration of community and Government agency concern. |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| | | | | | An Adaptive Management Strategy has been developed to respond to any observed impacts to creeks from subsidence as a result of LW W2 and, if required, will inform the modification of the commencing end of LW W3 to potentially avoid impacts to Stonequarry Creek. This strategy will be implemented at 1,000 metres of LW W2 extraction.<br><br>The Water Management Plan includes an assessment of the potential impacts to ephemeral drainage lines and surface water systems within the Study Area based on subsidence and baseflow loss predictions and with consideration of surface water impacts associated with mining previously undertaken in the region. This is provided in Section 4 of the WMP. |
| | | | | A detailed assessment of potential impacts mining operations on the ecological health of waterways in a catchment context that includes aquatic ecology. | Potential impacts to aquatic ecology from the mining of LW W3-W4 are discussed in Section 4.1 of the Biodiversity Management Plan and Section 4.1.8 of the Water Management Plan. |
| | | | | A detailed groundwater and geological model that would allow for an accurate scientific based understanding of | The detailed groundwater model and potential impacts associated with the mining of LW W3-W4 are |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| | | | | identification of potential impacts associated with the proposal on both surface and groundwaters. | discussed in Section 4.2 of the Water Management Plan. |
| | | | | A Water Management Plan detailing intended water quality monitoring that includes triggers based on ecological health parameters and monitoring for the presence of any re-emergence of water to the surface from mine induced fractures. | A detailed water quality monitoring plan and associated TARP is documented in the Water Management Plan. This is provided in Section 5 and Appendix A of the WMP.<br><br>The water quality monitoring plan and TARP incorporate learnings from monitoring and TARP assessments undertaken for LW W1-W2, and have been developed with consideration to ecological health parameters as guided by the Biodiversity Management Plan.<br><br>The 'Impact to pool level, natural drainage behaviour or overland connected flow' TARP includes a trigger stating that if impacts are observed at the monitoring sites, a visual inspection of downstream reaches will be undertaken, and if re-emergence is identified a water quality monitoring program will be implemented at the re-emergence location/s. |
| | | | | Any first or second other order watercourse be subject to a detailed assessment of likely subsidence | The Water Management Plan includes an assessment of the potential impacts to ephemeral |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| | | | | induced impacts prior to the commencement of any extraction activity. | drainage lines within the Study Area based on subsidence and baseflow loss predictions, and with consideration to surface water impacts associated with mining previously undertaken in the region. This assessment is included in Section 4.1.1 of the Water Management Plan and Section 5.4.1 of the Subsidence Predictions and Impact Assessment Report (Appendix A). |
| | | | | **Biodiversity Management Plan** | |
| | | | | An accurate assessment of the extent and nature of impact of LW W3 and LW W4 on aquatic ecology (including downstream waterways). | Potential impacts to aquatic ecology are discussed in Section 4.1 of the Biodiversity Management Plan. |
| | | | | The terrestrial assessment be based on the most up to date vegetation mapping and the implementation of the Plan involve targeted surveys for flora and fauna species identified as being likely to occur on the site prior to the commencement of works. | Baseline terrestrial monitoring has been completed in the Western Domain since 2017 and will be continued during and after LW W3-W4 mining. This monitoring program meets the requirements of this comment.<br>The terrestrial monitoring program is discussed in Section 3.2 and Section 5.2 of the Biodiversity Management Plan. |
| | | | | **Subsidence impacts to local roads** | |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| | | | | The updated Risk Management Plan to apply to Longwalls W3 and W4 be agreed upon by both parties prior the commencement of any activity management of repair works due to subsidence impacts be the responsibility of Tahmoor Colliery. | Tahmoor Coal will consult with WSC during the preparation of the LW W3-W4 Wollondilly Shire Council Management Plan for the management of WSC -managed roads, bridges and culverts. Tahmoor Coal will seek input from WSC, as well as approval of the plan from WSC prior to implementation.<br><br>Consultation will continue between Tahmoor Coal and WSC as required for the management of WSC-managed structures during the extraction of LW W3-W4. |
| **Community and Landowners** | | | | | |
| Tahmoor Colliery Community Consultative Committee (TCCCC) | 5/03/2020<br>4/07/2020<br>3/09/2020<br>3/12/2020<br>4/03/2021 | Meeting | Quarterly meetings are held with the Tahmoor Colliery Community Consultative Committee (TCCCC) and representatives of Tahmoor Coal at the Tahmoor Mine or via teleconference. These meetings are an opportunity to provide the TCCCC with a quarterly update of activities at Tahmoor Mine, including details of the proposed LW W3-W4 Extraction Plan. | No comments have been made regarding the proposed LW W3-W4 Extraction Plan during TCCCC meetings. | Noted. |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| Registered Aboriginal Parties | 15/08/2019 | Letter via email | EMM Heritage Consultants, on behalf of Tahmoor Coal, sent a draft version of the Aboriginal Cultural Heritage Assessment (ACHA) for LW W1-W4 to all 13 Registered Aboriginal Parties (RAPs) for review.<br><br>The RAPs consisted of Cubbitch Barta Native Title Claimants (Cubbitch Barta), Tharawal Local Aboriginal Land Council (TLALC), Darug Land Observations, Barraby Cultural Services, Barking Owl Corporation, Goodragigbee Cultural and Heritage Corporation, Ngambaa Cultural Connections, A1 Indigenous Services, Didge Ngunawal Clan, Amanda Hickey Cultural Services, Yurandaali Cultural Services, Yulay Cultural Services, and the Butcarbin Aboriginal Corporation. | Responses were incorporated into the ACHA report. | Noted. |
| | 14/07/2020 | Letter via email | A letter of consultation was sent to all RAPs with notification of Tahmoor Coal's intention to extract LW W3-W4 and that a separate ACHA document will be prepared to support an AHIP application for the additional two longwalls, along with an additional Aboriginal Heritage | No comments received. | Noted.<br><br>A log of consultation undertaken including letters and relevant correspondence is included in Appendix C of the AHTR.<br><br>An ACHA report is currently being prepared for LW W3–W4, and will result in wider consultation and further opportunity for Aboriginal |

| Stakeholder | Date | Type of Consultation | Description of Consultation | Summary of Comments | Tahmoor Coal Response |
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| | | | Technical Report for the Extraction Plan for LW W3-W4. | | heritage stakeholders to provide cultural input into the assessment of the LW W3-W4 extraction area. |
| | 19/08/2021 | Teleconference | All RAPs were notified of the development of the Stonequarry Creek Rockbar Management Plan (SCRMP) and invited to attend a Teams meeting on 19 August 2021 to discuss the details of the plan. | RAPs stressed the high cultural and scientific significance of the grinding groove site. | Based on the feedback from the meeting updates to the monitoring program in the SCRMP were implemented. |
| Landowners of private property within the LW W3-W4 Study Area | 15/09/2020 - 8/10/2020 | Letter | A letter of consultation was sent to all landowners of private property within the LW W3-W4 Study Area between 15 September 2020 and 8 October 2020 informing residents of upcoming first and second workings. This letter included a Resident Information Pack and information about LW W3-W4, as well as an offer to landowners for the completion of a Pre-Mining Inspection. | Responses to this correspondence have been received with requests for PMIs. | PMIs have been scheduled where requested.<br>Going forward, Tahmoor Coal conducts regular consultation with nearby landowners / occupiers as LW W3 approaches and during the extraction of LW W3-W4. This includes consultation via written communication (eg letters, newsletters) and meetings (eg. door knocks, face to face meetings, phone calls). |
| | 27/05/2020, 16/07/2020, 29/09/2020, 9/11/2020 | Newsletters | A bi-monthly newsletter is sent to residents in the Western Domain to inform them of progress of mining in the area. These newsletters have noted the proposed longwalls West 3 and West 4. | No responses received. | Noted. |

## 2.2 Subsidence Background

### 2.2.1 History of Subsidence Predictions for the Western Domain

The Western Domain lies within ML 1376 and ML 1539, for which the EIS documents prepared by Kembla Coal and Coke (1993) and Olsen Environmental Consulting (1998) were approved, respectively.

A subsidence monitoring program was established at Tahmoor Mine in 1984, and this data was used alongside calculations using the incremental profile method to predict subsidence related impacts for future Tahmoor North Longwalls (Olsen Environmental Consulting, 1998). Although predictions were made for all proposed longwalls, Olsen Environmental Consulting identified that within the time between the extraction of the first and last longwalls at Tahmoor North, substantial changes in the understanding of subsidence and how it is predicted could occur. Therefore, the nature of the impacts to environmental features due to subsidence in the EIS was general.

Tahmoor Coal (then owned by Glencore) submitted a Subsidence Management Plan Application (SMP Application) for Longwalls 31 to 37 in December 2014 (Glencore, 2014). Of these proposed longwalls, Longwalls 33 to 37 were located in the Western Domain. Mine Subsidence Engineering Consultants (MSEC) prepared Report No. MSEC647 (Rev A), which provided subsidence predictions and impact assessments on natural and built features due to the proposed extraction of these longwalls in support of the SMP Application (MSEC, 2021).

The SMP Application was not approved completely, with only LW31 and LW32 being individually approved for extraction.

The SMP Application was placed on public exhibition to provide Government agencies, community members and other relevant stakeholders the opportunity to submit feedback on the report. A number of submissions were made against the SMP Application, and a summary is provided in **Table 2-3**.

**Table 2-3 Submissions made regarding the SMP Application for Longwalls 31-37**

| Source of Submission | Date of Submission | Submission Summary | Tahmoor Coal Response |
|---|---|---|---|
| Office of Environment and Heritage (OEH) (now DPIE – Environment, Energy and Science (EES) Group) | 21/04/2015 | OEH made the following key comments regarding the SMP Application:<br>• an adequate or comprehensive review of impacts likely to occur as a result of proposed mining was not provided;<br>• a proposal regarding the remediation of affected areas was not included;<br>• the effect on ecological and social values associated with higher order streams likely to be impacted by mining was not considered; and<br>• the monitoring program outlined in the original SMP Application was inadequate and poorly designed considering the scale of likely impacts.<br>OEH made the following recommendations: | Noted. |
| | | • Longwalls to be reconfigured so as to not pass directly below 3rd – 5th order streams (including Cedar, Stonequarry, Matthews and Redbank Creeks) | The Western Domain Mine Plan was revised to avoid passing directly below 3rd order and higher streams, which includes Matthews Creek, Cedar Creek and Stonequarry Creek. |
| | | • Impact to above creeks is remediated so that flows and pool holding capacity is equivalent to pre-mining activity. | Appendix D Master TARP includes action for a Corrective Action Management Plan in the event that subsidence predictions for impacts to creeks are exceeded. |
| | | • A review of the potential downstream effects of loss of flow to Stonequarry Creek, particularly in relation to Picton STP discharges. | Section 4.1.1 and Section 4.1.2 of the Water Management Plan (WMP) (Volume 2). |
| | | • A review of the cumulative flow loss from all streams already affected and those likely to be affected by future Tahmoor mining in the Upper Nepean River | Section 3.1.2 and Section 4.1.1 of the WMP (Volume 2). |
| | | • Statistically rigorous experimental monitoring design and assessment program with adequate baseline data for stream flow, pool levels, groundwater and biological communities. | Section 3, Section 5, Section 6 and Appendix A of the WMP (Volume 2); Section 3, Section 5, Section 6 and Appendix A of the Biodiversity Management Plan (BMP) (Volume 3). |
| Martin Krogh – Principal Scientist | 26/02/2015 | In addition to the comments made by OEH, Martin Krogh (Principal Scientist Major Assessments) from OEH made the following additional recommendations: | See below. |

| Source of Submission | Date of Submission | Submission Summary | Tahmoor Coal Response |
|---|---|---|---|
| Major Assessments (OEH) (now EES) | | • Shortening of LW33 so that is does not pass directly beneath, or within the angle of draw, the junction of Cedar and Stonequarry Creeks. | The Western Domain Mine Plan was revised to avoid passing directly below 3rd order and higher streams, which includes Matthews Creek, Cedar Creek and Stonequarry Creek. |
| | | • LW34 is shortened so that it does not pass directly beneath, or within the angle of draw, of Cedar Creek. | The Western Domain Mine Plan was revised to avoid passing directly below 3rd order and higher streams, which includes Matthews Creek, Cedar Creek and Stonequarry Creek. |
| DPI Office of Water (now DPIE Water) | 08/04/2015 | DPI Water made the following recommendations: | See below. |
| | | • Preparation and submission of a Groundwater Monitoring and Modelling Plan (GWMMP) to the Office of Water for Approval. The GWMMP must meet the requirements of the *NSW Aquifer Interference Policy (2012)* and modelling guidelines prepared by the Office of Water (*Groundwater Monitoring and Modelling Plans – Information for prospective mining and petroleum exploration activities*). | Groundwater Technical Report (Volume 2), which will be provided as part of the Extraction Plan to relevant government authorities for review. |
| | | • Model must be numerical and consider impact predictions, baseline conditions, and potential losses of infrastructure following mining subsidence. | Section 4.2 of the Groundwater Technical Report (Volume 2). |
| | | • Explicitly address NSW AIP in the revised Environmental Management Plan. | Sections 2.1.2 and 4.3.3 of the Groundwater Technical Report (Volume 2) |
| | | • Consultation with Office of Water regarding notification procedures in relation to groundwater impacts. | Appendix A of the WMP (Volume 2). |
| | | • Refer to obligations and entitlements outlined in the relevant water sharing plan/s. | Section 2.2.1 of the WMP (Volume 2). |
| | | • Classification of Stonequarry Creek as ephemeral to be revised, available data suggests this is incorrect. | Section 3.1.1 of the WMP (Volume 2). |
| | | • Mitigation measures to be proposed regarding changes to cease to pump levels/ zero flow days for present, licensed water users at Stonequarry Creek. | Appendix A of the WMP (Volume 2). |
| | | • Environmental flows for Stonequarry Creek Management Zone of the Upper Nepean River – Upstream Warragamba Water Source to be included in TARP. | Appendix A of the WMP (Volume 2). |

| Source of Submission | Date of Submission | Submission Summary | Tahmoor Coal Response |
|---|---|---|---|
| | | • Clarification of the development of the stream flow database and defined flow reduction triggers for the TARP prior to the approval of the application, or at least six months prior to the commencement of LW33. | Section 3.1.2 and Appendix A of the WMP (Volume 2). |
| | | • Review of risks to impacts on geomorphic features such as cliffs and rock outcrops associated with gorges on Cedar and Stonequarry Creek. | Subsidence Predictions and Impact Assessment Report (Appendix A), Land Management Plan (Volume 2), and Geotechnical Assessment (Volume 2). |
| | | • Revised TARP to include appropriate mitigation and repair measures for damage caused to watercourses. | Appendix A of the WMP (Volume 2). |
| | | • Extraction within the gorges of Redbank, Matthews, Cedar and Stonequarry Creeks only to be undertaken once subsidence predictions for LW28-30 is complete and validated. | The Western Domain Mine Plan was revised to avoid passing directly below 3rd order and higher streams, which includes Matthews Creek, Cedar Creek and Stonequarry Creek. |
| | | • Validation of impact predictions for shale/clay bedded watercourses (Rumkers and Newlands Gully's) to be undertaken following the passing of each longwall. | Section 4 and Section 5 of the WMP (Volume 2). |
| | | • Effectiveness of mitigation methods for shale/clay bedded watercourses presented prior to the extraction of subsequent longwalls beneath the watercourse. | Potential impacts from mining are unlikely to have discernible impacts on the tributaries, and mitigation measures are not required for these features. |
| | | • Review of fluvial geomorphology for any river reaches undermined by LW 31-37. Demonstration of effectiveness of management and mitigation methods is to be explicit and recommendations for future mining subsidence presented. | The Western Domain Mine Plan was revised to avoid passing directly below 3rd order and higher streams, and will not mine under any river reaches. |
| Wollondilly Shire Council | 19/03/2015 | Wollondilly Shire Council made the following recommendations: | See below. |
| | | • SMP Application to include a discussion on the features and potential impacts of intended mining operations on the Bargo River from a catchment context. | Section 4 of the WMP (Volume 2). |
| | | • Provide a detailed description of the properties and behaviour of the groundwater environment in a lateral and vertical direction. | Section 3.2 of the WMP (Volume 2). |
| | | • Provide a conceptual and computerised model of groundwater behaviour that is informed by extensive groundwater monitoring undertaken at various depths. | Section 4 of the Groundwater Technical Report (Volume 2). |
| | | • Inclusion of an assessment of potential impacts to farm dams based on the scientifically rigorous assessment of subsidence requested by WSC. | Geotechnical Assessment (Volume 2). |

| Source of Submission | Date of Submission | Submission Summary | Tahmoor Coal Response |
|---|---|---|---|
| | | • Collection of additional baseline data to adequately inform a detailed groundwater assessment and modelling prior to consideration of approval. | Baseline Private Bore Assessment (Volume 2). |
| | | • Detailed assessment of potential subsidence related impacts to surface and groundwater in a context that is consistent with current and scheduled scientific research. | Section 4 of the WMP (Volume 2). |
| Rivers SOS | 20/04/2015 | Rivers SOS recommended that the mine plan is redesigned to avoid tributaries and creeks, notably Redbank, Matthews, Cedar and Stonequarry Creeks. | The Western Domain Mine Plan was revised to avoid passing directly below 3rd order and higher streams, which includes Matthews Creek, Cedar Creek and Stonequarry Creek. |
| Fisheries NSW | 15/04/2015 | Stonequarry and Cedar Creek are considered key fish habitats. In order to assess any physico-chemical impacts to the flow of these watercourses, Fisheries has requested: | See below. |
| | | • A longitudinal section through the area to be impacted by LW33 and monitoring program to detect any subsidence impacts; | Subsidence Monitoring Program (Volume 4). |
| | | • Development of methods for remediation of potential blockages (physical or chemical) if they are found to exceed natural blockages that exist in the system prior to mining activity. | Blockage to fish passage as a result of mining activities is not likely to exceed natural blockages that exist in Stonequarry Creek and Cedar Creek. During periods of low flow, flow within the creeks is disconnected, and mining activities are not likely to result in blockage to fish passage in medium to high flow. |
| NSW Trade and Investment, Division of Resources and Energy – Environmental Sustainability Unit (ESU) | 28/04/2015 | ESU requested for Tahmoor Coal to provide justification for undermining Stonequarry Creek. Justification should include scenarios for set back and direct undermining with an assessment of social, economic and environmental impacts with consideration of concerns raised by other Government agencies. | The Western Domain Mine Plan was revised to avoid passing directly below 3rd order and higher streams, which includes Matthews Creek, Cedar Creek and Stonequarry Creek. |
| | | ESU noted that there was no discussion in the SMP Application regarding the use of water resources from creeks by adjacent landowners and the associated measures of compensation to be offered if subsidence leads to flow diversion and loss of pool holding capacity. | Section 3.1.6 of the WMP (Volume 2). |
| | | ESU recommended that Tahmoor Coal provides information on the extent of predicted pool loss within creeks. In particular, details pertaining to the distance from areas of longwall extraction that drainage is likely to occur. To be summarised and presented on a map. | Section 4.1 of the WMP (Volume 2). |

| Source of Submission | Date of Submission | Submission Summary | Tahmoor Coal Response |
|---|---|---|---|
| | | ESU recommended that pre-mining hydrological investigation be undertaken for all creeks noted in original SMP Application as being impacted. This should include information on:<br>• Pre-mining ground/strata characterisation;<br>• Surface/groundwater interactions for the streams;<br>• Baseline monitoring of shallow aquifers;<br>• Baseline stream mapping;<br>• Predicted areas of pool loss; and<br>• Post-impact remediation objectives and performance criteria. | Surface Water Technical Report (Volume 2), Groundwater Technical Report (Volume 2) and WMP (Volume 2). |
| Community submission | 17/5/2015 | Residents concerned regarding impacts to dwelling, dams, water and gas infrastructure as a result of LW30, LW31 and LW32. | Not relevant to the proposed longwalls in the Western Domain. |
| Community submission | 18/3/2018 | Two submissions raised concerning Stonequarry Creek drying out due to proposed mining and that the archaeological sites along Stonequarry Creek will be impacted. | Section 4.1 of the WMP (Volume 2) and Section 4.1 of the Heritage Management Plan (HMP) (Volume 3). |
| Community submission | 14/4/2015 | Resident raised concerns over subsidence impacts to dwelling, and requested a pre-mining inspection and an independent valuation prior to mining. | Consultation with residents in the LW W1-W2 Study Area has commenced, and requests for pre-mining inspections and other requests have been met. |
| Community submission | 1/5/2015 | Resident raised concerns over subsidence impacts to dwelling. | Consultation with residents in the LW W1-W2 Study Area has commenced, and requests for pre-mining inspections have been met. |

The current mine plan is a revision of this SMP Application mine plan. This review was based on many factors including feedback received from the community and NSW Government agencies following submission of the SMP Application in 2014 and geotechnical, operational and mining conditions.

The current mine plan includes four longwalls (LW W1-W4) located in the Western Domain, with LW W1 the first longwall to be mined in this new series of longwalls. The mine design review resulted in re-orientation of longwalls in the Western Domain from a north-west to south-east orientation to a north to south orientation to avoid mining directly under streams of third order or above (Matthews Creek, Cedar Creek and Stonequarry Creek).

A comparison between the longwalls proposed in the previous 2014 SMP Application and the current layout of LW W3-W4 is provided in **Figure 2-1**. The key differences based on the feedback from the community, stakeholders and Government agencies are listed below:

- LW W3-W4 do not mine directly beneath Matthews, Cedar and Stonequarry Creeks, whilst the previously proposed LWs 33 to 37 were located directly beneath the creeks. The change in mine plan will substantially reduce the severity and extent of mining-induced impacts on the creeks; and
- LW W3-W4 will be progressively extracted from west to east, whilst the previously proposed LWs 33 to 37 were sequenced in the opposite direction.

From a mine subsidence perspective, the change in direction will reduce the impact of transient subsidence effects on houses within Stonequarry Estate (particularly during the mining of LW W1 and LW W2), and will also allow Tahmoor Coal to track mining-induced movements as the mine extends towards the Picton Railway Tunnel on the MSR, which is a substantial and significant item of civil infrastructure.

To support this Extraction Plan, MSEC have revised the subsidence predictions for the proposed longwalls and prepared the report *MSEC1112 Tahmoor Coal – Longwalls W3 and W4, Subsidence Predictions and Impact Assessments for Natural and Built Features due to the Extraction of the Proposed Longwalls W3 and W4 in Support of the Extraction Plan Application* (hereafter referred to as the 'Subsidence Predictions and Impact Assessment Report') (MSEC, 2021; refer to **Appendix A**).

As discussed in **Section 5.3.11** of the Subsidence Predictions and Impact Assessment Report (MSEC, 2021), the maximum predicted total valley closure for Matthews Creek and Cedar Creek due to the extraction of LW W1-W4 is 200 mm, and the predicted rate of impact for the pools along these creeks due to LW W3-W4 extraction is less than 10 %. Tahmoor Coal considers that these current subsidence predictions are acceptable, and that the current mine plan appropriately balances the requirements of resource recovery, minimisation of environmental impact, and consideration of community and Government agency concern.

If the measured mining induced movements were to be in excess of the predicted values, a review of the model will be undertaken and would include the review of subsidence values and impacts to any surface features within the Extraction Plan Study Area.

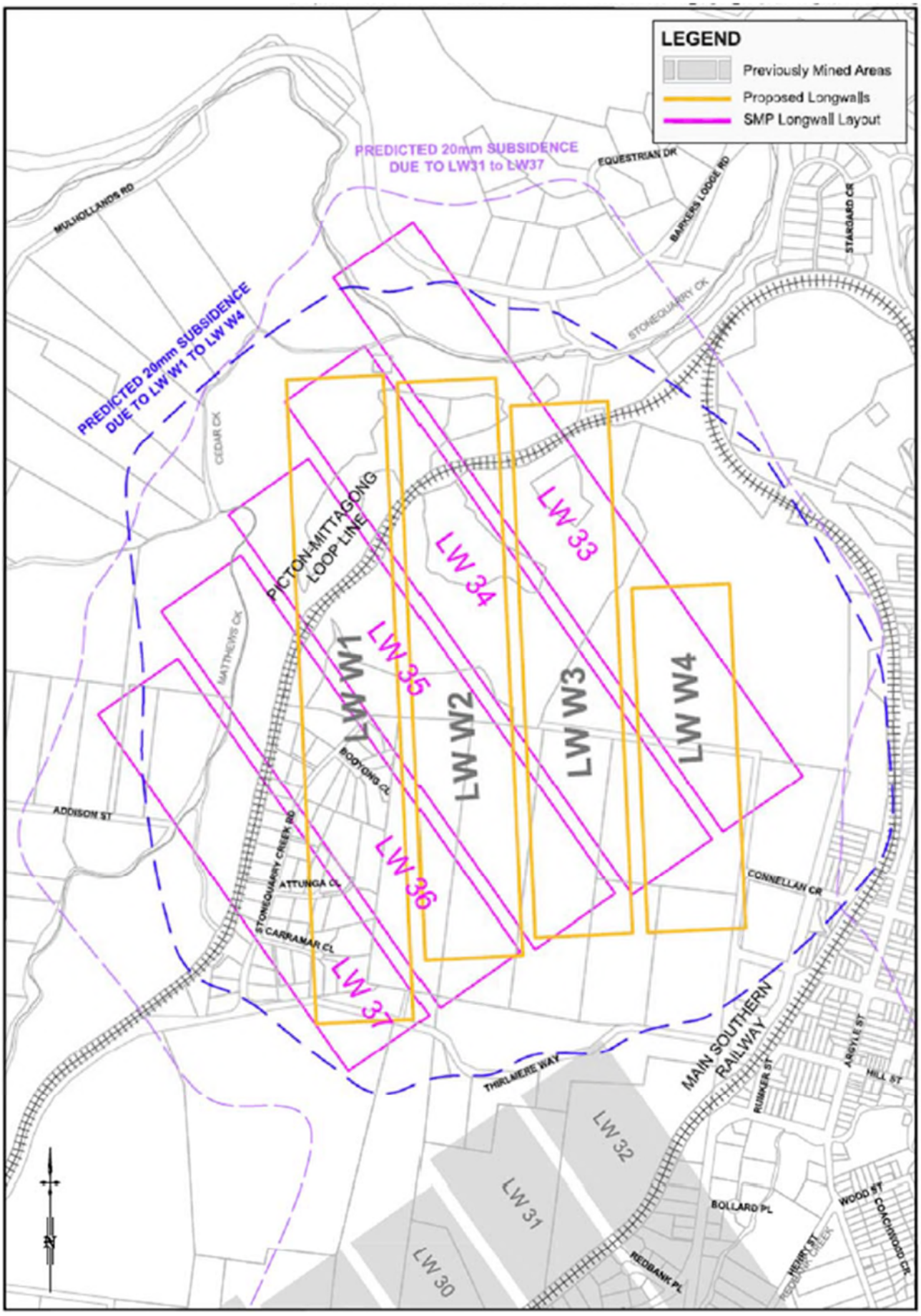



**Figure 2-1 Comparison between Mine Layouts for LW W3-W4 and LWs 33 to 37 (MSEC, 2021)**

### 2.2.2 Current Methods and Models used by MSEC

The following sections outline the methods and models used by MSEC to provide revised subsidence predictions for the proposed LW W3-W4 (MSEC, 2021; refer to **Appendix A**). Particular note has been made regarding the process of review of the methods and models used to make predictions of subsidence effects, subsidence impacts and environmental consequences.

#### Incremental Profile Method

The predicted conventional subsidence parameters for the proposed LW W3-W4 have been determined using the Incremental Profile Method (IPM), which has been developed by MSEC. The method is an empirical model based on a large database of observed monitoring data from previous mining within the Southern, Newcastle, Hunter and Western Coalfields of NSW. Subsidence predictions made using the IPM use the database of observed incremental subsidence profiles, the longwall geometries, local surface and seam information and geology. The predictions can be further tailored to local conditions where observed monitoring data is available close to the mining area (MSEC, 2021).

The use of the IPM at the Tahmoor Mine has been continually reviewed and refined based on the latest available ground movement monitoring data. The subsidence model has been reviewed after the completion of each longwall as part of the Six Monthly Subsidence Impact Reports. Initially, the subsidence predictions for the longwalls at Tahmoor Mine were based on the standard model for the Southern Coalfield. In 2009, the IPM was refined using the extensive monitoring data that had been collected during the extraction of LW22 to LW25 at the mine (MSEC, 2021).

A detailed review of the IPM was carried out in 2014, based on the monitoring data that had been collected during the extraction of LW22 to LW28. It was found that the calibrated IPM generally provided reliable predictions at the Tahmoor Mine. However, exceedances occurred in the areas of increased subsidence above LW24A and above the south-eastern ends of LW25 to LW27. The IPM has again been reviewed based on the latest monitoring data, and details of this review are provided in **Section 3.6** of **Appendix A**.

#### Numerical Model

A numerical model has been developed by MSEC for the Tahmoor Mine using Universal Distinct Element Code (UDEC). This method is a two-dimensional Discrete Element Method (DEM) comprising deformable elements that interact via compliant contacts (Itasca, 2015). The numerical modelling has been undertaken to supplement the predictions obtained using the empirical IPM. The UDEC model has been derived from the base model that was developed for the Southern Coalfield for mining in the Bulli Coal Seam (Barbato, 2017). The numerical model has been updated for the local stratigraphy relevant to LW W3-W4, and has been calibrated for the local mining conditions of LW W3-W4 using the available ground monitoring data (MSEC, 2021).

#### 2002 ACARP Method

The predicted upsidence and closure movements for the longwalls at Tahmoor Mine have been obtained using the empirical method outlined in Australian Coal Association Research Program (ACARP) Research Project No. C9067 (Waddington and Kay, 2002), referred to as the 2002 ACARP method. A comparison between the measured and predicted valley related effects for previously extracted longwalls at Tahmoor Mine has been provided in **Section 3.10** of **Appendix A**.

### Prediction of Strains

A linear relationship between curvature and strain provides a reasonable prediction for conventional tensile and compressive strains. In the Southern Coalfields, it has been found that a factor of 15 provides a reasonable relationship between the predicted maximum curvature and the predicted maximum conventional strains. This method is effective for predicting typical values when the ground subsides regularly with no localised or elevated strains due to near-surface geological structures or valley closure effects. The maximum strains can be much greater than these typical values and there can be considerable variation from the linear relationship.

The Subsidence Predictions and Impact Assessment Report (MSEC, 2021) therefore provided a statistical approach to account for the variability, instead of just providing a single predicted conventional strain. The range of potential strains above the proposed LW W3-W4 has been determined using monitoring data from the previously extracted longwalls at the mine. The range of strains measured during the extraction of these longwalls should, therefore, provide a reasonable indication of the range of potential strains for the proposed LW W3-W4. The data used in the analysis of observed strains included those resulting from both conventional and nonconventional anomalous movements, however did not include those resulting from valley related effects.

### Ground Stain

Ground strain comprises two components, being normal strain and shear strain, which can be interrelated using Mohr's Circle. The magnitudes of the normal strain and shear strain components are, therefore, dependent on the orientation in which they are measured. The maximum normal strains (i.e. principal strains) are those in the direction where the corresponding shear strain is zero.

Normal strains along monitoring lines can be measured using 2D and 3D techniques, by taking the change in horizontal distance between two points on the ground and dividing by the original horizontal distance between them. This provides the magnitude of normal strain along the orientation of the monitoring line and, therefore, this strain may not necessarily be the maximum (i.e. principal) strain.

Shear deformations are more difficult to measure, as they are the relative horizontal movements perpendicular to the direction of measurement. However, 3D monitoring techniques provide data on the direction and the absolute displacement of survey marks and, therefore, the shear deformations perpendicular to the monitoring line can be determined. Shear deformations perpendicular to monitoring lines can be described using various parameters, including horizontal tilt, horizontal curvature, horizontal mid-ordinate deviation, angular distortion and shear index.

Horizontal mid-ordinate deviation has been used as the measure for shear deformation, which is defined as the differential horizontal movement of each survey mark, perpendicular to a line drawn between two adjacent survey marks.

## 2.3 Extraction Plan Team

In accordance with Condition 13H(i) of DA 67/98, Tahmoor Coal sought the endorsement of qualified and experienced persons to prepare the Extraction Plan from the Secretary of DPIE. On 14 September 2020, the Director of Resource Assessments (as nominated by the Planning Secretary) endorsed the appointment of the experts listed in **Table 2-4**.

A copy of the letter of endorsement from DPIE is provided in **Appendix B**.

**Table 2-4** provides a list of experts who have assisted in the preparation of the Extraction Plan, the key component plans, sub-management plans and other supporting documents.

**Table 2-4 Extraction Plan Team**

| DA 67/98 Condition | Management Plan and Supporting Documents | Company | Prepared By |
|---|---|---|---|
| Condition 13H | Extraction Plan Main Document | Tahmoor Coal | April Hudson<br>Zina Ainsworth |
| Condition 13H(vii)(a) | Subsidence Monitoring Program | MSEC | Daryl Kay |
| | | Tahmoor Coal | April Hudson |
| | Subsidence Geotechnical Report | SCT | Ken Mills |
| Condition 13H(vii)(b) | Built Features Management Plan | MSEC | Daryl Kay |
| | | Tahmoor Coal | April Hudson |
| | Infrastructure Management Plans for the following built infrastructure:<br>• Electricity (Endeavour Energy)<br>• Gas (Jemena)<br>• Potable Water (Sydney Water)<br>• Sewer (Sydney Water)<br>• Stonequarry Wastewater Treatment Plan (Bradcorp)<br>• Telecommunications (Telstra, NBN)<br>• Main Southern Railway (ARTC)<br>• Picton-Mittagong Heritage Railway (Railcorp and Transport Heritage NSW)<br>• State roads and infrastructure (TfNSW)<br>• Local roads, bridges and culverts (Wollondilly Shire Council)<br>• Weatherboard Cottage (Wollondilly Shire Council)<br>• Built structures | MSEC<br><br>Rail Management Group | Daryl Kay |
| Condition 13H(vii)(c) | Water Management Plan | Tahmoor Coal | April Hudson |
| | Surface Water Technical Report | Hydro Engineering & Consulting | Anthony Marszalek, Camilla West |
| | Flood Impact Study | WRM | David Newton, Ruebin Nguon |
| | Groundwater Technical Report | SLR | Will Minchin, Maxime Philbert, Jackson Newton |
| | Baseline Private Bore Assessment | GeoTerra | Andrew Dawkins |

| DA 67/98 Condition | Management Plan and Supporting Documents | Company | Prepared By |
|---|---|---|---|
| Condition 13H(vii)(d) | Biodiversity Management Plan | Tahmoor Coal | April Hudson |
| | Aquatic Biodiversity Technical Report | Niche Environment & Heritage | Matthew Russell |
| | Terrestrial Biodiversity Technical Report | Niche Environment & Heritage | Luke Baker, Alex Christie |
| Condition 13H(vii)(e) | Land Management Plan | Tahmoor Coal | April Hudson |
| | Geotechnical Assessment | Douglas Partners | Roderick Haselden, Fiona Henry |
| | Land and Agricultural Resource Assessment | SLR | Murray Fraser |
| Condition 13H(vii)(f) | Heritage Management Plan | Tahmoor Coal | April Hudson |
| | Stonequarry Creek Rockbar Management Plan | Tahmoor Coal | April Hudson, David Talbert, Zina Ainsworth |
| | Aboriginal Heritage Technical Report | EMM | Ryan Desic, Pamela Chauvel |
| | Historical Heritage Technical Report | EMM | Pamela Chauvel, Pamela Kottaras |
| Condition 13H(vii)(g) | Public Safety Management Plan | Tahmoor Coal | April Hudson |
| Condition 13H(vii)(h) | Trigger Action Response Plans | Tahmoor Coal | April Hudson |
| Condition 13H(vii)(i) | Contingency Plans (part of the TARPs) | Tahmoor Coal | April Hudson |

# 3 Extraction Plan Overview

## 3.1 Extraction Plan Study Area

### 3.1.1 Definition of Study Area

The Extraction Plan Study Area is defined as the surface area that is likely to be affected by the extraction of LW W3-W4 from the Bulli Coal Seam. This Study Area has been calculated by combining the areas bound by the following limits:

- The predicted limit of vertical subsidence, taken as the 20 millimetre (mm) subsidence contour resulting from the extraction of LW W3-W4; and
- A 35$^{o}$ angle of draw line from the limit of proposed extraction for LW W3-W4.

The Study Area is illustrated in **Figure 3-1**.

An expansion of the Study Area to 600 m from extraction has also been defined by MSEC (2021) (refer to **Figure 3-1**). Relevant features within this 600 m buffer could be susceptible to far-field or valley related movements have been included for consideration in the Subsidence Predictions and Impact Assessment Report (MSEC, 2021) and within this Extraction Plan and associated documents. The 600 m buffer for natural features has been included based on recommendations in the independent inquiry report titled *Impacts of Underground Coal Mining on Natural Features in the Southern Coalfields – Strategic Review* (NSW Department of Planning (DoP), 2008).

### 3.1.2 Environmental Features in the Study Area

Topography within the Study Area is generally undulating with rises in the south-east falling to low slopes in the north. A small ridgeline rises above LW W1-W2 with a high point of approximately 286 m above Australian Height Datum (AHD). The surface falls towards the three dominant drainage channels – Matthews Creek, Cedar Creek, and Stonequarry Creeks – to the north-western part of the Study Area, and towards Redbank Creek in the south-eastern part of the Study Area. The minimum surface level in the Study Area is approximately 162 m AHD at Stonequarry Creek in the north-western part of the Study Area (MSEC, 2021).

Matthews Creek, Cedar Creek, and Stonequarry Creek are located in the northern and western sections of the Study Area, and are located in the catchment of the Hawkesbury-Nepean River. Matthews Creek is situated on the western side of the Study Area and flows north into Cedar Creek, which subsequently flows north then east into Stonequarry Creek in the northern section of the Study Area. Stonequarry Creek flows east through the Study Area before flowing south-east to its confluence with the Nepean River. All three dominant drainage channels are considered low flow or intermittent channels, and the Study Area also includes a number of intermittent tributaries and numerous small farm dams (SLR, 2021a; HEC, 2021).

The surface lithology above the proposed LW W1-W2 generally comprises the Wianamatta Group, with the Hawkesbury Sandstone exposed at Matthews Creek, Cedar Creek, and Stonequarry Creek (MSEC, 2021). The landscape of the Study Area includes a number of steep slopes.

The Study Area is generally cleared for small scale rural production, while native vegetation is present predominantly in the riparian zones of the Study Area.

The Study Area does not include any Drinking Water Catchment Areas, Declared Special Areas, springs, sea, lake, shoreline, natural dams, rivers, cliffs or pagodas, escarpments, land prone to flooding or inundation, National Parks, State Forests, State Conservation Areas, areas of significant geological interest, or other natural features considered significant in the Study Area (MSEC, 2021).

**Table 3-1** provides a summary of the environmental features within the Extraction Plan Study Area and the Key Component Plans and associated documents that discuss and manage these features.

**Table 3-1 Environmental and Built Features within the LW W3-W4 Extraction Plan Area and Relevant Management Plans**

| Feature | Identification and Assessment (other than in Subsidence Prediction and Impact Assessment Report (MSEC, 2021) | Management and Monitoring (other than in Subsidence Monitoring Program) |
|---|---|---|
| Natural and Heritage Features | | |
| Waterways | • Surface Water Technical Report (HEC, 2021) | • WMP |
| Floodplains | • Flood Impact Study (WRM, 2020) | • WMP |
| Groundwater | • Groundwater Technical Report (SLR, 2021a)<br>• Baseline Private Bore Assessment (GeoTerra, 2021) | • WMP |
| Steep slopes, rock outcrops, cliffs | • Geotechnical Assessment (Douglas Partners, 2021) | • LMP |
| Land and soil capability | • Land and Agricultural Resource Assessment (SLR, 2021b) | • LMP |
| Aquatic ecology | • Aquatic Biodiversity Technical Report (Niche, 2021a) | • BMP |
| Terrestrial ecology | • Terrestrial Biodiversity Technical Report (Niche, 2021b) | • BMP |
| Aboriginal heritage | • Aboriginal Heritage Technical Report (EMM, 2021a) | • HMP<br>• SCRMP |
| Historical heritage | • Historical Heritage Technical Report (EMM, 2021b) | • HMP<br>• BFMP<br>• Weatherboard Cottage Management Plan |
| Built Features (infrastructure and building owner in brackets) | | |
| Electrical infrastructure (Endeavour Energy) | • Endeavour Energy Management Plan | • BFMP<br>• Endeavour Energy Management Plan |
| Gas infrastructure (Jemena) | • Jemena Management Plan | • BFMP<br>• Jemena Management Plan |
| Potable water infrastructure (Sydney Water) | • Sydney Water Potable Water Management Plan | • BFMP<br>• Sydney Water Potable Water Management Plan |
| Sewer infrastructure (Sydney Water) | • Sydney Water Sewer Management Plan | • BFMP<br>• Sydney Water Sewer Management Plan |

| | | |
|---|---|---|
| Stonequarry Wastewater Treatment Plant and associated infrastructure (Bradcorp) | • Stonequarry Wastewater Treatment Plan Management Plan | • BFMP<br>• Stonequarry Wastewater Treatment Plan Management Plan |
| Telstra infrastructure (Telstra) | • Telstra Management Plan | • BFMP<br>• Telstra Management Plan |
| NBNCo infrastructure (NBNCo) | • NBN Management Plan | • BFMP<br>• NBN Management Plan |
| Main Southern Railway (ARTC) | • Main Southern Railway Management Plan | • BFMP<br>• Main Southern Railway Management Plan |
| Picton-Mittagong Loop Line (Rail Transport Museum) | • Picton-Mittagong Railway Management Plan | • BFMP<br>• Picton-Mittagong Railway Management Plan |
| State roads and infrastructure (TfNSW) | • TfNSW Management Plan | • BFMP<br>• TfNSW Management Plan |
| Local roads, bridges and culverts (Wollondilly Shire Council) | • Wollondilly Shire Council Management Plan | • BFMP<br>• Wollondilly Shire Council Management Plan |
| Weatherboard Cottage (Wollondilly Shire Council) | • Weatherboard Cottage Management Plan | • BFMP<br>• HMP<br>• Weatherboard Cottage Management Plan |
| Dwellings, driveways, pools, rural structures (privately owned) | • Built Structures Management Plan | • BFMP<br>• Built Structures Management Plan |
| Farm dams (privately owned) | • Surface Water Technical Report (HEC, 2021)<br>• Land and Agricultural Resource Assessment (SLR, 2021b)<br>• Geotechnical Assessment (Douglas Partners, 2021) | • WMP |
| Groundwater bores (privately owned) | • Baseline Private Bore Assessment (GeoTerra, 2021)<br>• Groundwater Technical Report (SLR, 2021) | • BFMP<br>• WMP |
| Permanent survey control marks (Spatial Services) | • BFMP | • BFMP |

### 3.1.3 Land Use and Built Features in the Study Area

The Study Area is located within the Wollondilly Shire Council Local Government Area, and the predominant land uses within the Study Area include rural residential, small scale cattle and horse grazing. A small number of poultry farms, orchards and commercial vegetable gardens also exist within or adjacent to the Study Area. However, no poultry farms or protected cropping businesses have been observed in the Study Area (SLR, 2021b).

The following properties are noted within and near the Extraction Plan Study Area:

- 69 private properties;
- One property with historical heritage significant requiring consultation with Wollondilly Shire Council (Weatherboard Cottage);

- Land owned by State Rail Authority of New South Wales associated with the Picton-Mittagong Loop Line; and
- Crown Land primarily associated with road corridors.

A number of built features have been identified within the vicinity of the proposed longwalls. These built features include:

- Gas infrastructure;
- Electrical infrastructure;
- Potable water infrastructure;
- Sewer infrastructure;
- Telecommunications infrastructure;
- MSR;
- PMLL;
- Public roads, drainage culverts, and bridges;
- State roads and infrastructure;
- Heritage-listed properties;
- Rural property and structures (built structures, pools, septic tanks, farm dams);
- Groundwater bores; and
- Survey control marks.

The Study Area does not include agricultural utilisation or agricultural sustainability of farm land, tanks, gas or fuel storages, poultry sheds, glass houses, hydroponic systems, irrigation systems, factories, workshops, gas or fuel storages or associated plants, waste storages or associated plants, buildings equipment or operations that are sensitive to surface movements, surface mining voids or rehabilitation areas, mine infrastructure including tailings dams or emplacement areas, liquid fuel pipelines, reservoirs, air strips, hospitals, places of worship, schools, shopping centres, community centres, office buildings, swimming pools, bowling greens, ovals or cricket grounds, race courses, golf courses, tennis courts, items of architectural significance, flats, units or caravan parks (MSEC, 2021).

There are eight registered Aboriginal heritage sites within the Study Area, which includes one grinding groove site, six open artefact sites, and one modified tree (**Figure 4-4**). There are a number of identified rockshelters that area located beside Cedar Creek and Matthews Creek, however are outside the Study Area and are located approximately 800 to 1.5 km from the LW W3-W4 footprint.

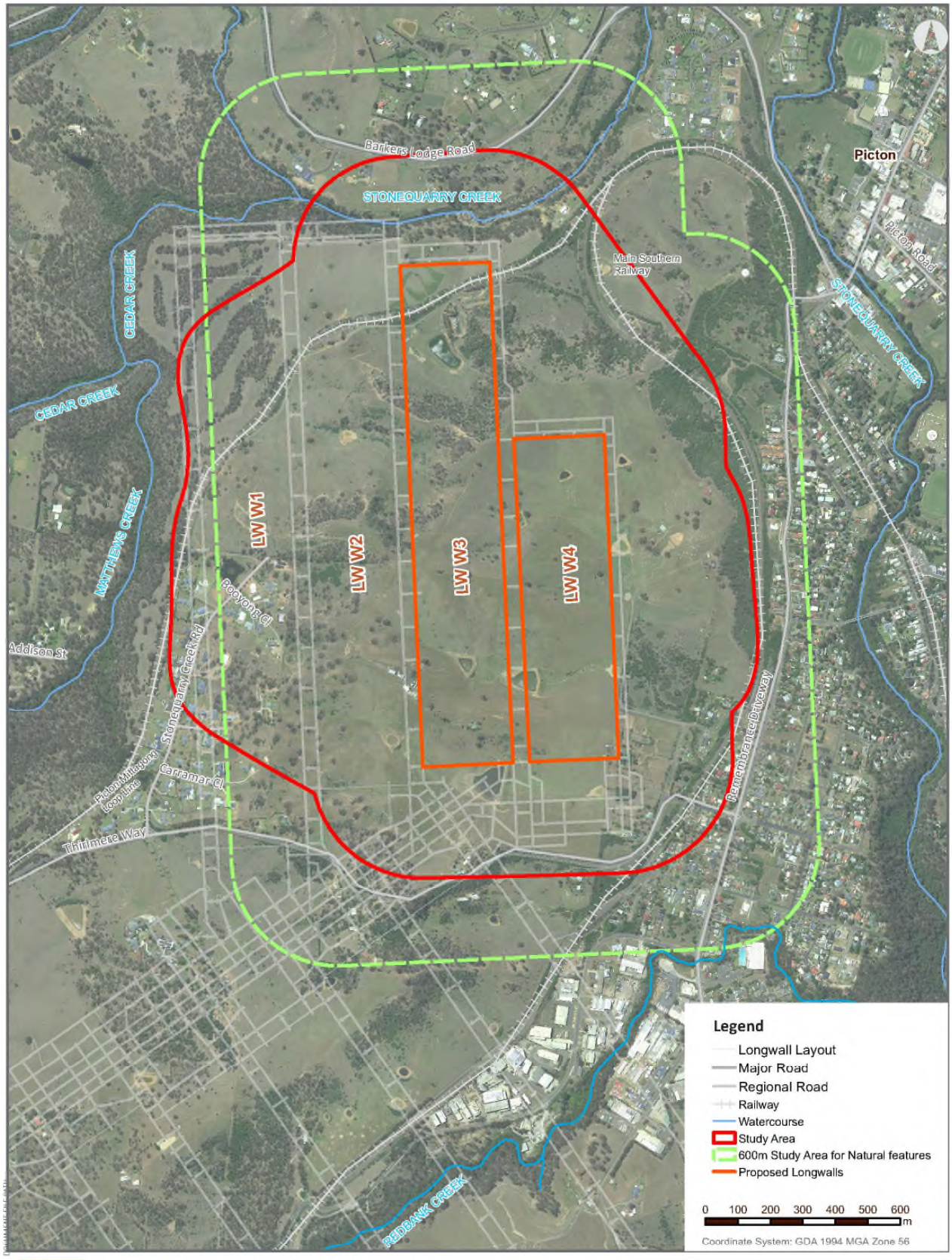
Six listed historical heritage sites have been identified within the Study Area, including:

- Mushroom Tunnel (Wollondilly Local Environment Plan (WLEP) – I144);
- Weatherboard Cottage (WLEP – I211);
- Redbank Uniting Church (WLEP – I146);
- Picton Tunnel (ARTC S170 Register as part of the Picton Railway Deviation Works);
- Antill Street Underbridge (ARTC S170 Register); and
- Rural landscape of Thirlmere Way (Department of Health S170 Register).

In addition, three listed heritage sites (Picton Viaduct, Argyle Street Underbridge and a pedestrian overbridge at 96.1 km (measured from Sydney Central Station in Sydney)) have been identified as potentially being sensitive to far field horizontal movements during extraction of LW W3-W4.

Items of railway infrastructure that are not listed on heritage registers but have collective local significance include six culverts on the PMLL, seven culverts on the MSR, the subway at 88.133, the Bridge on Matthews Lane, a high retaining wall, Prince Street Overbridge, and Connellan Crescent Overbridge (EMM, 2021b).

**Table 3-1** provides a summary of the built features within the Extraction Plan Study Area and the Key Component Plans and associated documents that discuss and manage these features.




# EXTRACTION PLAN STUDY AREA

Tahmoor North Western Domain Longwalls West 3 and West 4 Extraction Plan

*FIGURE 3-1*

Date: 10/05/2021

Data Sources:
© NSW DFSI (2019); © NSW Mining (2019); © SIMEC (2019)
Aerial Imagery: © Photomapping Services (November 2018)

## 3.2 Approvals and Licensing Requirements

Tahmoor Coal's operations are conducted in accordance with applicable Commonwealth and State environmental, planning, mining safety, and natural resource legislation. A register of relevant environmental legislative and regulatory requirements is maintained by Tahmoor Coal in a compliance database.

Tahmoor Mine currently operates under a number of approvals relevant to this Extraction Plan, including:

- Development Consent granted by Wollondilly Shire Council in 1975 following an EIS in 1975 allowing for the development of a mine and associated mine infrastructure;
- Development Consent granted in 1976 (and subsequent minor modifications) to allow for a coal preparation plant, and reject emplacement;
- Development Consent (DA 57/93) (and subsequent minor modification) granted by the Land and Environment Court in 1994 for an expansion of underground coal mining into the Tahmoor North area, continued operation of the existing Tahmoor Mine surface facilities including the coal preparation plant and the reject emplacement area;
- Development Consent (DA 67/98) (and subsequent minor modification) granted by the Minister for Urban Affairs and Planning in 1999 for the expansion of underground mining into those areas of Tahmoor North in which mining was classified as prohibited development;
- Consolidated Coal Lease 716, ML 1376 and ML 1539;
- Tahmoor Mining Operations Plan (MOP); and
- Environmental Protection Licence (EPL) 1389 under the *Protection of the Environment Operations Act 1997*.

These approvals constitute Tahmoor Coal's licences to conduct underground mining operations by longwall and bord and pillar mining methods within the Bulli Coal Seam.

Applicable conditions from development consent DA 57/93 and DA 67/98, Consolidated Coal Lease and Mining Leases, EPL 1389 and relevant Work Health and Safety Legislation are outlined in the following sections below. Each component management plan prepared in support of the Extraction Plan also includes these details as well as where each plan addresses the DPIE *Draft Guidelines for the Preparation of Extraction Plans V5* (NSW Department of Planning & Environment, 2015) and WHS Legislation.

Statutory approvals areas and mining tenement boundaries applicable to the LW W3-W4 Extraction Plan Study Area are detailed on **Figure 1-2** and A0 Graphical Plan 5 (refer to **Volume 5** of this Extraction Plan).

### 3.2.1 Project Approval

DA 67/98 provides the conditional planning approval framework for mining activities in the Western Domain to be addressed within an Extraction Plan and supporting management plans. Conditions relevant to this Extraction Plan from DA 67/98 are detailed in **Table 3-2**. It should be noted that Longwall 33 as used in DA 67/98 is now referred to as LW W1.

**Table 3-2 DA 67/98 Condition Requirements for Extraction Plans**

<table>
<tr><th>Condition</th><th colspan="2">Condition Requirement</th><th>Section Addressed</th></tr>
<tr><td colspan="4">SUBSIDENCE<br>Performance Measures – Natural and Heritage Features etc.</td></tr>
<tr><td>13A</td><td colspan="2">The Applicant must ensure that extraction of Longwall 33 and subsequent longwalls does not cause any exceedances of the performance measures in Table 1.<br>Note: The Applicant will be required to define more detailed performance indicators (including impact assessment criteria) for each of these performance measures in the various management plans that are required under this consent.</td><td rowspan="12">Section 3.4.2, Section 3.5, Section 3.6, Section 5<br>Appendix C – Coal Resource Recovery Plan<br>Appendix D – Master TARP<br>Volumes 2-4 – Key Component Plans and Supporting Documents</td></tr>
<tr><td rowspan="11">Table 1</td><td>Feature</td><td>Performance Measure</td></tr>
<tr><td colspan="2">Biodiversity</td></tr>
<tr><td>Threatened species, threatened populations, or endangered ecological communities</td><td>• Negligible environmental consequences.</td></tr>
<tr><td colspan="2">Heritage Sites</td></tr>
<tr><td>Heritage sites</td><td>• Negligible subsidence impacts or environmental consequences.<br>• Negligible loss of heritage value.</td></tr>
<tr><td>Other Aboriginal and heritage sites</td><td>• Negligible subsidence impacts or environmental consequences.</td></tr>
<tr><td colspan="2">Mine workings</td></tr>
<tr><td>First workings</td><td>• To remain long term stable and non-subsiding.</td></tr>
<tr><td>Second workings</td><td>• To be carried out only within the approved mine plan, in accordance with an approved Extraction Plan.</td></tr>
<tr><td colspan="2">Note: The Applicant will be required to define more detailed performance indicators (including impact assessment criteria) for each of these performance measures in the various management plans that are required under this consent.</td></tr>
<tr><td>13B</td><td colspan="2">Measurement and monitoring of compliance with performance measures and performance indicators in this consent is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans and monitoring programs. In the event of a dispute over the appropriateness of proposed methods, the Secretary will be the final arbiter.</td><td>Section 3.6, Section 5<br>Appendix D – Master TARP<br>Volumes 2-4 – Key Component Plans and Supporting Documents</td></tr>
</table>

<table>
<tr><th>Condition</th><th>Condition Requirement</th><th>Section Addressed</th></tr>
<tr><td colspan="3">Additional Offsets</td></tr>
<tr><td>13C</td><td>If the Applicant exceeds the performance measures in Table 1 and the Secretary determines that:<ul><li>it is not reasonable or feasible to remediate the subsidence impact or environmental consequence; or</li><li>remediation measures implemented by the Applicant have failed to satisfactorily remediate the subsidence impact or environmental consequence,</li></ul>then the Applicant must provide a suitable offset to compensate for the subsidence impact or environmental consequence, to the satisfaction of the Secretary.</td><td>Noted.<br>Performance measures in Table 1 of DA 67/98 are not anticipated to be exceeded.</td></tr>
<tr><td>13D</td><td>The offset must give priority to like-for-like physical environmental offsets, but may also consider payment into any NSW Offset Fund established by ESS, or funding or implementation of supplementary measures such as:<ul><li>actions outlined in threatened species recovery programs;</li><li>actions that contribute to threat abatement programs;</li><li>biodiversity research and survey programs; and/or</li><li>rehabilitating degraded habitat.</li></ul>Note: Any offset required under this condition must be proportionate with the significance of the impact or environmental consequence</td><td>Noted.<br>Performance measures in Table 1 of DA 67/98 are not anticipated to be exceeded.</td></tr>
<tr><td colspan="3">Performance Measures – Built Features</td></tr>
<tr><td>13E</td><td>The Applicant must ensure that extraction of Longwall 33 and subsequent longwalls does not cause any exceedances of the performance measures in Table 2.<br>Notes<ul><li>The Applicant will be required to define more detailed performance measures in the Built Features Management Plans or Public Safety Management Plan.</li><li>Requirements regarding safety or serviceability do not prevent preventative or mitigatory actions being taken prior to or during mining in order to achieve or maintain these outcomes.</li><li>Requirements under this condition may be met by measures undertaken in accordance with the Coal Mine Subsidence Compensation Act 2017.</li></ul></td><td rowspan="8">Section 3.5, Section 3.6, Section 5<br>Appendix D – Master TARP<br>Volumes 2-4- Key Component Plans and Supporting Documents</td></tr>
<tr><td>Table 2</td><td><table>
<tr><th>Feature</th><th>Performance Measure</th></tr>
<tr><td colspan="2">Key Public Infrastructure</td></tr>
<tr><td><ul><li>Main Southern Railway;</li><li>Picton Tunnel;</li><li>Picton-Mittagong Loop Line; and</li><li>Electricity transmission lines and towers.</li></ul></td><td><ul><li>Always safe and serviceable.</li><li>Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.</li></ul></td></tr>
<tr><td colspan="2">Other Infrastructure</td></tr>
<tr><td><ul><li>Electricity distribution lines, poles and associated towers;</li></ul></td><td><ul><li>Always safe.</li></ul></td></tr>
</table></td></tr>
</table>

| Condition | Condition Requirement | | Section Addressed |
|---|---|---|---|
| | • Unsealed roads and road culverts, fire trails, fences and other built features; and<br>• Other public infrastructure. | • Serviceability should be maintained wherever practicable.<br>• Loss of serviceability must be fully compensated.<br>• Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated. | |
| | • Privately-owned residences. | | |
| | • Other privately-owned built features and improvements, including farm dams, swimming pools, tennis courts, roads, tracks and fences | | |
| | Public Safety | | |
| | Public Safety | • Negligible additional risk. | |
| | *Notes:*<br>• The Applicant will be required to define more detailed performance measures in the Built Features Management Plans or Public Safety Management Plan.<br>• Requirements regarding safety or serviceability do not prevent preventative or mitigatory actions being taken prior to or during mining in order to achieve or maintain these outcomes.<br>• Requirements under this condition may be met by measures undertaken in accordance with the *Coal Mine Subsidence Compensation Act 2017*. | | |
| 13F | Any dispute between the Applicant and the owner of any built feature over the interpretation, application or implementation of the performance measures in Table 2 is to be settled by the Secretary, following consultation with the Resources Regulator. Any decision by the Secretary shall be final. | | Noted. |
| First Workings | | | |
| 13G | The Applicant may carry out first workings within the underground mining area approved mine plan, other than in accordance with an approved Extraction Plan, provided that the Resources Regulator is satisfied that the first workings are designed to remain stable and non-subsiding in the long term, except insofar as they may be impacted by approved second workings.<br>Notes:<br>• The intent of this condition is not to require an additional approval for first workings, but to ensure that first workings are built to geotechnical and engineering standards sufficient to ensure long term stability, with negligible resulting direct subsidence impacts.<br>• Resources Regulator should be consulted when designing first workings in order to provide comment on matters relating to coal resource recovery. | | Section 3.4.2<br>Appendix B – Letters of Consultation<br>Appendix C – Coal Resource Recovery Plan |
| Extraction Plan | | | |
| 13H | The Applicant must prepare an Extraction Plan for all second workings in Longwall 33 and subsequent longwalls to the satisfaction of the Secretary. Each Extraction Plan must: | | This document |

| Condition | Condition Requirement | Section Addressed |
|---|---|---|
| 13H(i) | be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary; | Section 2.3<br>Appendix B – Letters of Consultation |
| 13H(ii) | be prepared in consultation with Resources Regulator, ESS, DSC, WaterNSW and DPIE Water and DPIE Crown Lands; | Section 2.1<br>Appendix B – Letters of Consultation |
| 13H(iii) | include detailed plans of existing and proposed first and second workings and overlying surface features, including any applicable adaptive management measures; | Section 7<br>Volume 5 – Graphical Plans |
| 13H(iv) | include adequate consideration of mine roof and floor conditions, pillar width to height ratio, final pillar design dimensions and the long-term stability of pillars which has been undertaken in consultation with the Resources Regulator; | Section 2.1.2, Section 3.3<br>Appendix C – Coal Resource Recovery Plan |
| 13H(v) | provide revised predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed mining covered by the Extraction Plan, incorporating any relevant information obtained since this consent; | Section 3.5<br>Appendix A – Subsidence Predictions and Impact Assessment Report |
| 13H(vi) | describe in detail the performance indicators to be implemented to ensure compliance with the performance measures in Table 1 and Table 2, and manage or remediate any impacts and/or environmental consequences; | Section 3.4.2, Section 3.5, Section 3.6, Section 5<br>Appendix C – Coal Resource Recovery Plan<br>Appendix D – Master TARP<br>Volumes 2-4 – Key Component Plans and Supporting Documents |
| 13H(vii) | include a: | See below |
| 13H(vii)(a) | Subsidence Monitoring Program which has been prepared in consultation with the Resources Regulator to: | Section 5<br>Volume 4 – Subsidence Monitoring Program |
| | • describe the ongoing conventional and non-conventional subsidence monitoring program; | |
| | • provide data to assist with the management of risks associated with conventional and non-conventional subsidence; | |
| | • validate the conventional and non-conventional subsidence predictions; | |
| | • analyse the relationship between the predicted and resulting conventional and non-conventional subsidence effects and predicted and resulting impacts under the plan and any ensuring environmental consequences; and | |
| | • inform the adaptive management process; | |
| 13H(vii)(b) | Built Features Management Plan which has been prepared in consultation with the Resources Regulator, to manage the potential subsidence impacts of the proposed underground workings on built features, and which: | Section 4.7<br>Volume 4 – BFMP<br>LW W3-W4 Main Southern Railway Management Plan (to be prepared) |
| | • has been prepared in consultation with the owners of potentially affected features, including ARTC and NRSR in relation to potential impacts on rail infrastructure; | |

| Condition | Condition Requirement | Section Addressed |
|---|---|---|
| | • addresses in appropriate detail all items of key public infrastructure (with particular consideration of transmission lines and towers (including angle towers), the Main Southern Railway including the Picton Tunnel, other public infrastructure and all classes of other built features; | |
| | • recommends appropriate pre-mining mitigation measures to reduce subsidence impacts; | |
| | • recommends appropriate remedial measures and includes commitments to mitigate, repair, replace or compensate predicted impacts on potentially affected built features in a timely manner, including an Emergency Response Plan for emergency mitigation works in the Picton Tunnel; and | |
| | • in the case of all key public infrastructure, and other public infrastructure except roads, trails and associated structures, reports external auditing for compliance with ISO 31000 (or alternative standard agreed with the infrastructure owner), and provides for annual auditing of compliance and effectiveness during extraction which may impact the infrastructure; | |
| 13H(vii)(c) | Water Management Plan which has been prepared in consultation with EPA, DPIE Water, Resources Regulator and WaterNSW, which provides for the management of potential impacts and environmental consequences of the proposed underground workings on watercourses and aquifers, including: | Section 4.3<br>Volume 2 – WMP |
| | • detailed baseline data on: - surface water flows and quality in watercourses and/or water bodies that could be affected by subsidence; and – groundwater levels, yield and quality in the region, including for privately-owned licensed bores; | |
| | • surface and groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse impacts on water resources or water quality; | |
| | • a surface water monitoring program to monitor and report on:<br>- stream flows and quality;<br>- stream and riparian vegetation health; and<br>- channel and bank stability; | |
| | • a groundwater monitoring program to monitor and report on:<br>- springs, their discharge quantity and quality, as well as associated groundwater dependent ecosystems;<br>- groundwater inflows to the underground mining operations;<br>- the height of groundwater depressurization;<br>- background changes in groundwater yield/quality against mine-induced changes, in particular, on groundwater bore users in the vicinity of the site;<br>- permeability, hydraulic gradient, flow direction and connectivity of the deep and shallow groundwater aquifers; | |
| | • a flood management protocol to:<br>- identify secondary access routes for those properties that could potentially be adversely impacted by 1% AEP flood events; | |

| Condition | Condition Requirement | Section Addressed |
|---|---|---|
| | - regularly consult with landowners that would not have either a primary or secondary access route during 1% AEP flood events;<br>- provide up-to-date information (including subsidence and flooding predictions) to the State Emergency Service and WSC regarding privately-owned residences that could be adversely affected by lack of access during 1% AEP flood events; and<br>- work with landowners, State Emergency Service and WSC to develop evacuation plans to ensure landowners know what to do in the event of emergency as a result of a 1% AEP flood event; | |
| | • a description of any adaptive management practices implemented to guide future mining activities in the event of greater than predicted impacts on aquatic habitat; | |
| | • a program to validate the surface water and groundwater models for the development, and compare monitoring results with modelled predictions; and | |
| | • a plan to respond to any exceedances of the surface water and groundwater assessment criteria; | |
| 13H(vii)(d) | Biodiversity Management Plan which has been prepared in consultation with ESS, which establishes a baseline data for the existing habitat on the site, including water table depth, vegetation condition, stream morphology and threatened species habitat, and provides for the management of potential impacts and environmental consequences of the proposed second workings on aquatic and terrestrial flora and fauna, with a specific focus on threatened species, populations and their habitats, EECs and groundwater dependent ecosystems | Section 4.5<br>Volume 3 – BMP |
| 13H(vii)(e) | Land Management Plan which has been prepared in consultation with any affected public authorities, which provides for the management of potential impacts and/or environmental consequences of the proposed underground workings on land in general, with a specific focus on cliffs, minor cliffs, rock face features, steep slopes and agricultural enterprises | Section 4.4<br>Volume 2 – LMP |
| 13H(vii)(f) | Heritage Management Plan which has been prepared in consultation with Heritage NSW and relevant stakeholders for heritage items which provides for the management of potential environmental consequences of the proposed second workings on heritage items; | Section 4.6<br>Volume 3 – HMP, SCRMP |
| 13H(vii)(g) | Public Safety Management Plan which has been prepared in consultation with the Resources Regulator, which ensures public safety and manages access on the site; | Section 4.8<br>Volume 4 – PSMP |
| 13H(vii)(h) | Trigger Action Response Plan/s addressing all features in Table 1 and Table 2, which contain: | Section 3.6.2<br>Appendix D – Master TARP |
| | • appropriate triggers to warn of increased risk of exceedance of any performance measure; and | Section 3.6.2<br>Appendix D – Master TARP |
| | • specific actions to respond to high risk of exceedance of any performance measure to ensure that the measure is not exceeded; | Section 3.6.3<br>Appendix D – Master TARP |

| Condition | Condition Requirement | Section Addressed |
|---|---|---|
| | • an assessment of remediation measures that may be required if exceedances occur and the capacity to implement the measures; and | Section 3.6.3 |
| | • adaptive management where monitoring indicates that there has been an exceedance of any performance measure in Table 1 or Table 2, or where any such exceedance appears likely; and | Section 3.6.4 |
| 13H(vii)(i) | Contingency Plan that expressly provides for: | Section 3.6.3<br>Appendix D – Master TARP |
| | • adaptive management where monitoring indicates that there has been an exceedance of any performance measure in Table 1 and Table 2, or where any such exceedance appears likely; and | Section 3.6.4 |
| | • an assessment of remediation measures that may be required if exceedances occur and the capacity to implement those measures; and | Section 3.6.3 |
| | • includes a program to collect sufficient baseline data for future Extraction Plans. | Section 5.4<br>Volume 4 – Subsidence Monitoring Program |
| 13I | The Applicant must not undertake second workings following the extraction of Longwall 32 except in accordance with an Extraction Plan approved by the Secretary and must implement Extraction Plans as approved by the Secretary.<br>Notes:<br>• The preparation and implementation of Extraction Plans may be staged, with each plan covering a defined area of underground workings. In addition, these plans are only required to contain management plans that are relevant to the specific underground workings that are being carried out.<br>• The burden of proof that any declines in performance of privately-owned registered bores and wells were not due to mining impacts rests with the Applicant. | Noted. |
| Payment of Reasonable Costs | | |
| 13J | The Applicant must pay all reasonable costs incurred by the Department to engage a suitably qualified, experienced and independent person/s to review the adequacy of any aspect of an Extraction Plan. | Noted. |

For the purpose of this Extraction Plan and associated documents, 'negligible' is defined as being 'so small and insignificant as to not be worth considering'. Further discussion on the definition of 'negligible' in light of the Aboriginal heritage item located on the Stonequarry Creek Rockbar is provided in the Stonequarry Creek Rockbar Management Plan.

In addition to the requirements in DA 67/98 specific to the preparation of this Extraction Plan, **Table 3-3** also provides a summary of additional requirements listed in DA 57/93 and DA 67/98 that are applicable to this Extraction Plan.

**Table 3-3 Additional Development Consent Requirements for this Extraction Plan**

| Condition | Condition Requirement | Tahmoor Coal Response / Section Addressed |
|---|---|---|
| **DA 57/93** | | |
| 51 | The applicant shall: | See below. |
| | (a) Set up and participate in a community liaison programme upon gaining development consent, in order to provide periodically updated information on the progress of mining and explaining. Predicted and measured mining induced subsidence effects on residences and land; | An ongoing community consultation program has been established. |
| | (b) Prior to commencement of longwall mining, in any approval granted by the Department of Mineral Resources, negotiate with the Mine Subsidence Board and the WSC as to the most appropriate means to provide a community information service to respond to queries on subsidence, to provide expert advice on specific housing and land within approved mining areas, and the provision of general advice on subsidence effects, the rights of owners of improvements in making a claim for compensation for subsidence or vibration induced damage to improvements and the rights of review and appeal concerning Mine Subsidence Board decisions; and | Communication with WSC, SA NSW and the TCCCC is ongoing throughout subsidence management planning, impact investigation, temporary repairs and compensation claims. An ongoing community consultation program has been established (refer Section 2.1) which includes distribution of Resident Information Packs to all properties providing general advice on subsidence effects, the rights of owners of improvements in making a claim for compensation (for subsidence or vibration induced damage to improvements) and rights of review and appeal concerning SA NSW decisions. |
| | (c) Provide a representative for an annual liaison meeting of government agencies and WSC to discuss the results of subsidence monitoring, future mining proposals and study technical issues relevant to subsidence damage. | A representative is available to attend any annual liaison meeting. |
| 52 | The applicant shall carry out subsidence monitoring according to the requirements of the Department of Mineral Resources and taking into consideration the advice of the annual liaison meeting. The applicant shall report the results of subsidence monitoring into an annual environmental management plan report and such results shall be publicly accessible through the WSC. | Managed through the Extraction Plan process.<br>Subsidence monitoring results will be summarised in the Tahmoor Coal Annual Review and made available on the Tahmoor Coal website. |
| **DA 67/98** | | |
| 8 | The Applicant must ensure that all statutory requirements, including all relevant legislation, Regulations, Australian Standards, Codes, Guidelines and Notices, Conditions and Directions of the WSC and relevant government agencies are met and approvals obtained. | All known conditions and regulatory requirements are dealt with in this Extraction Plan. |

| Condition | Condition Requirement | Tahmoor Coal Response / Section Addressed |
|---|---|---|
| 14 | The Applicant must prepare and implement a plan to monitor and manage any subsidence impacts on septic tanks or package sewage treatment plants. The plan must be prepared to the satisfaction of the Secretary and in consultation with WSC. The Applicant must implement the plan as approved by the Secretary. | Addressed in the Subsidence Predictions and Impact Assessment Report (Appendix A) and the BFMP (Volume 4). |
| 15(i) | The Applicant must notify each relevant landowner/occupier under whose property it intends to commence first workings at least one (1) month prior to commencement of such workings; and | Landowners were notified regarding first workings for LW W3-W4 on 6 August 2020. |
| 15(ii) | The Applicant must notify in writing each landowner/occupier within a 35 degree angle of draw of its intentions to proceed with second workings at least three (3) months prior to making an application to Resources Regulator for approval of a Subsidence Management Plan or application to the Secretary for the approval of an Extraction Plan. | This notice has been provided to all landholders / residents in the LW W3-W4 Study Area on 15 September 2020. Refer to **Section 2.1.2.** |
| 16 | If determined necessary by Resources Regulator or the Secretary, the Applicant must cause a pre-mining structural inspection to be carried out on substantial improvements on land identified by the Resources Regulator or the Secretary at least one month prior to commencement of second workings taking place that may cause subsidence impacts on the relevant property. These inspections must:<br>• be conducted with the consent of the landowner/occupier and in consultation with SA NSW;<br>• include a report prepared on the structural integrity of all buildings in their entirety (including roofs, ceilings, openings, foundations and household sewage treatment and disposal systems);<br>• be conducted by an independent and technically qualified person;<br>• include permanent reference marks on each corner of all substantial improvements with level tied to Australian Height Datum to a stable point in the area; and<br>• include soil sampling for moisture content and soil type as appropriate.<br>A copy of the inspection report must be provided to the landowner/occupier upon completion. | Community members are encouraged to have pre-mining inspections undertaken by Tahmoor Coal and/or SA NSW prior to commencement of subsidence. Tahmoor Coal will also undertake structural inspections of all structures identified as possibly prone to major subsidence impacts. Subsidence management plans for structures take into account mitigation, monitoring and management of subsidence impacts and management plans developed in consultation with SA NSW. |
| 17 | Where a pre-mining structural inspection under Condition 16 involves a building identified in the Wollondilly Heritage Study the report must be prepared with the assistance of a qualified heritage expert. The Secretary may also require such a report on a building which is not identified in the Wollondilly Heritage Study be prepared with the assistance of a qualified heritage expert if the Secretary is satisfied, on the basis of available information, that the building may be older than 50 years and have heritage significance. Prior notice of such inspections must be provided to the Secretary by the Applicant to enable a decision to be made. | All identified local heritage items listed in the Wollondilly LEP and state heritage items listed on the State Heritage Register have been inspected by qualified heritage experts as part of the Extraction Plan process. |

| Condition | Condition Requirement | Tahmoor Coal Response / Section Addressed |
|---|---|---|
| | Note: Structural inspections by the Applicant are in addition to any pre-mining surveys conducted by the SA NSW. | |
| 29 | Prior to commencement of mining the Applicant must comply with the statutory requirements of NPWS in relation to works affecting Aboriginal sites. | Tahmoor Coal will apply for an Aboriginal Heritage Impact Permit from Heritage NSW prior to subsidence affecting the identified objects or sites. |
| 30 | If the Applicant becomes aware of any heritage or archaeological material that may be affected by mining or subsidence, all work likely to affect the material must cease immediately and the relevant authorities consulted about an appropriate course of action prior to recommencement of work. The relevant authorities may include NPWS, EES, Heritage NSW, and the Local Aboriginal Land Council. Any necessary permits or consents must be obtained and complied with prior to recommencement of work | Managements measures have been included in the HMP if potential or actual archaeological objects or sites are identified. |
| 31 | The Applicant must provide funding to WSC for independent counselling services for landowners who may request support on stress-related matters resulting from the development. These counselling services must be available to landowners from two years prior to mining of longwall panels that affect the landowner's property and until three years after completion of mining of longwall panels that affect the landowner's property. | Free confidential counselling service currently available to all residents and landowners impacted by mining to the satisfaction of WSC. This service is ongoing to completion of mine closure. |

There were no relevant commitments from the Statement of Commitments in Appendix 3 of DA 67/98 for this Extraction Plan.

### 3.2.2 Mining Lease Conditions

The LW W3-W4 Extraction Plan Study Area is associated with two approved ML held by Tahmoor Coal - ML 1376 and ML 1539 (refer to **Figure 1-2**).

ML 1376 was granted on 28 August 1995 following the receipt of development consent in 1994 from the Land and Environment Court (DA 57/93). This ML covers the DA 57/93 Application Area, which is predominantly rural area. This ML expired in 28 August 2016 and a request for renewal was been submitted 28 August 2015. This ML still remains current until the new ML is issued.

ML 1539 was granted on 16 June 2003 following the receipt of development consent in 1999 from the Minister for Urban Affairs and Planning (DA 67/98). This ML covers the DA 67/98 Application Area, which consists predominantly of railway land and certain urban areas. This ML will expire on 15 June 2024.

**Table 3-4** outlines the mining lease conditions relating directly to subsidence management from ML 1376 and ML 1539.

**Table 3-4 Mining Lease Conditions Relevant to this Extraction Plan**

| Mining Lease | Condition Number | Condition Requirement | Tahmoor Coal Response / Section Addressed |
|---|---|---|---|
| Methods of Operation / Extraction of Coal | | | |
| ML 1376 | 1 | The registered/lease holder shall extract as large a percentage of the coal in the subject area as is possible consistent with the, provisions of the *Coal Mines Regulation Act 1982* and the regulations thereunder and shall comply with any direction which may be given in this regard by the Minister. | The maximum amount of coal will be extracted as allowed by safety, geological, financial and Extraction Plan constraints.<br>Addressed in the Coal Resource Recovery Plan. |
| ML 1539 | 1 | | |
| Barriers | | | |
| ML 1376 | 2 | The lease holder shall not work or cause to be worked any seam of coal within the subject area without leaving, if the Minister so directs, a barrier of such width or a protective pillar or pillars of such size or sizes against any surface improvements or any feature whether natural or artificial. | Coal barriers will be maintained in accordance with Minister's directions.<br>Addressed in the Coal Resource Recovery Plan. |
| ML 1376 | 3 | The lease holder unless with the consent of the Minister and subject to such conditions as the Minister may impose shall not work or cause to be worked any seam of coal by underground methods within the barrier defined as follows:-<br>The land in the subject area within the zone adjacent to the Main Southern Line or the Mittagong – Picton Loop Line of the State Railway enclosed by an angle of draw of $35^0$ from the vertical plane of the boundary parallel to and thirty (30) m horizontally distant from either side of the railway lands, such angle of draw being measured outwards from the point on the vertical plane of the said boundary at the surface or at the level of the horizontal plane of the railway track, whichever may be the higher, to the floor of the coal seam in which mining operations are being carried out. | Coal will be extracted from beneath the PMLL in accordance with DA 67/98 and approved Extraction Plan requirements. |
| ML 1539 | 11 | | |
| Management and Rehabilitation of Lands (General) | | | |
| ML 1376 | 10 | The lease holder shall observe any instruction given or which may be given by the Minister with a view to minimising or preventing public inconvenience or damage to public or private property. | Instructions can be given through the Extraction Plan process and will be complied with.<br>Addressed in the:<br>• BFMP; and<br>• LMP. |
| ML 1539 | 19 | | |
| ML 1376 | 11 | Subject to any specific condition of this authority providing for rehabilitation or any particular part of the subject area affected by mining or activities associated therewith, the lease holder shall:<br>• Shape and revegetate to the satisfaction of the Minister, any part of the subject area | Instructions can be given through the Extraction Plan process and will be complied with.<br>Addressed in the:<br>• BFMP; and<br>• LMP. |

| Mining Lease | Condition Number | Condition Requirement | Tahmoor Coal Response / Section Addressed |
|---|---|---|---|
| | | that may, in the opinion of the Minister have been damaged or deleteriously affected by mining operations and ensure such areas are permanently stabilized, and,<br>• Reinstate and make safe, including sealing and/or fencing, any excavation within the subject area. | |
| ML 1376<br>ML 1539 | 12<br>20 | If required to do so by the Minister and within such time as may be stipulated by the Minister the lease holder shall carry out to the satisfaction of the Minister surveys of structures, buildings and pipelines on adjacent land holdings to determine the effect of operations on any such structures, buildings and pipelines. | Instructions can be given through the Extraction Plan process and will be complied with.<br>Addressed in the:<br>• Subsidence Monitoring Program; and<br>• BFMP |
| ML 1376<br>ML 1539 | 14<br>23 | If so directed by the Minister the lease holder shall rehabilitate to the satisfaction of the Minister and within such time as may be allowed by the Minister any lands within the subject area which may have been disturbed by the lease holder. | Such a direction can be given through the Extraction Plan process.<br>Addressed in the:<br>• BFMP;<br>• WMP;<br>• LMP;<br>• BMP; and<br>• HMP. |
| ML 1376 | 16 | If so directed by the Minister the lease holder shall rehabilitate to the satisfaction of the Minister and within such time as may be allowed by the Minister any lands within the subject area which may have been disturbed by mining or prospecting operations whether such operations were or were not carried out by the lease holder. | Such a direction can be given through the Extraction Plan process.<br>Addressed in the:<br>• BFMP;<br>• WMP;<br>• LMP;<br>• BMP; and<br>• HMP. |
| Roads | | | |
| ML 1376<br>ML 1539 | 31<br>31 | The lease holder shall pay to WSC, Department of Land and water Conservation or the Chief Executive, Roads and Traffic Authority the cost incurred by such Councillor Department or Chief Executive of making good any damage caused by operations carried on by or under the authority of the lease holder to any road adjoining or traversing the surface or the excepted surface, as the case may be of the subject area.<br>Provided that the amount to be paid by the lease holder as aforesaid shall be reduced by such sum of money if any as may be paid to the said Council, the Department of Land and Water Conservation or the Chief Executive, Roads and Traffic Authority as the case may be from the Mine Subsidence Compensation Fund constituted under the *Mine Subsidence* | All man-made surface improvements are covered by the Tahmoor Coal and will be repaired as required. Tahmoor Coal will cover financial losses such as business interruption, vegetation replacement, soil erosion etc as part of the Mining Act's compensable loss provisions.<br>Addressed in the BFMP. |

| Mining Lease | Condition Number | Condition Requirement | Tahmoor Coal Response / Section Addressed |
|---|---|---|---|
| | | *Compensation Act 1961*, in settlement of a claim for compensation for the same damage. | |
| Catchment Areas | | | |
| ML 1376 | 33 | The lease holder shall provide and maintain to the satisfaction of the Minister efficient means to prevent the contamination, pollution, erosion or siltation of any stream or watercourse or catchment area and shall observe any instruction given or which may be given by the Minister with a view to preventing or minimising the contamination, pollution or siltation of any stream watercourse or catchment area. | Addressed in the WMP. |
| Transmission Lines, Communication Lines and Pipelines | | | |
| ML 1376 | 35 | The lease holder shall as far as is practicable so conduct operations as not to interfere with or impair the stability or efficiency of any transmission line, communication line or pipeline traversing the surface or the excepted surface of the subject area and shall comply with any direction given or which may be given by the Minister in this regard. | The BFMP provides for the management of electrical infrastructure, telecommunications infrastructure, gas infrastructure, potable water infrastructure, and sewerage infrastructure. |
| ML 1539 | 41 | | |
| Aboriginal Place or Relic | | | |
| ML 1376 | 36 | The lease holder shall not knowingly destroy, deface or damage any aboriginal place or relic within the subject area except in accordance with an authority issued under the *National Parks and Wildlife Act 1974*, and shall take every precaution in drilling, excavating or disturbing the land against any such destruction, defacement or damage. | Addressed in the HMP. |
| ML 1539 | 43 | | |
| Special Conditions | | | |
| ML 1376 | 47 | Prior to the commencement of "second working" extraction lease holder shall give three (3) months written notice of intention to carry out such mining to the owners of overlying land on which there are substantial improvements. | This notice has been provided to all landholders / residents in the LW W3-W4 Study Area (15 September 2020). Refer to Section 2.1.2. |
| ML 1539 | 57 | | |

### 3.2.3 Environmental Licences

Tahmoor Mine operates under EPL 1389, which authorises carrying out of scheduled activities associated with coal works, mining for coal and sewage treatment processing by small plants.

An Annual Return stating Tahmoor Mine's compliance with the conditions of EPL 1389 and summarising monitoring results and complaints is completed and submitted to the EPA by 28 February of each year. Each Annual Review is lodged via the EPL portal.

### 3.2.4 Work, Health and Safety Legislations

Tahmoor Coal has developed a Health and Safety Management Plan (TAH-HSEC-00189) that integrates plans, policies and procedures that enables a systematic approach to establishing and maintaining effective systems to manage health and safety consistent with WHS legislation.

Tahmoor Mine has been planned so that LW W3-W4 will meet all the requirements of the following Work Health and Safety (WHS) Legislation:

- *Work Health and Safety Act 2011 (*WHS Act);
- *Work Health and Safety Regulation 2017* (WHS Regulation);
- *Work Health and Safety (Mines and Petroleum Sites) Act 2013* (WHSMP Act); and
- *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* (WHSMP Regulation).

The WHS Act and WHS Regulations came into force on 1 January 2012. The WHS Act, is the primary piece of legislation dealing with the health and safety of workers in NSW. The WHSMP Act and WHSMP Regulations apply to all mining workplaces in NSW and commenced on 1 February 2015. These laws support the WHS Act and WHS Regulation and provide additional provisions for work health and safety issues unique to mines and petroleum sites.

This Extraction Plan has been prepared to address the relevant requirements of the WHS legislation, principally within the context of subsidence related risks to public safety with regards to private property and public infrastructure.

Details regarding the compliance with the relevant requirements of the WHS Regulations and WHSMP Regulations are provided in **Table 3-5**, as well as being discussed in the PSMP.

#### WHS Requirements for Persons Conducting a Business or Undertaking

In accordance with Section 19 of the WHS Act, all persons conducting a business or undertaking (PCBUs), including mine operators and contractors, have a primary duty of care to ensure the health and safety of workers they engage, or whose work activities they influence or direct, so far as is reasonably practicable. PCBUs must also ensure, so far as is reasonably practicable, the health and safety of other persons is not put at risk from work carried out as part of the conduct of the business or undertaking.

Under Clause 9(1) of the WHSMP Regulation, a PCBU at a mine, including the Mine Operator, must manage risks to health and safety associated with the mining operations in accordance with Part 3.1 of the WHS Regulation. Specifically, Clause 67(1) of the WHSMP Regulation requires the operator of an underground coal mine to (in complying with Clause 9) manage risks to health and safety associated with subsidence at the mine. Clause 67(2) of the WHSMP Regulation outlines specific requirements regarding subsidence including monitoring, investigation and reporting.

The Mine Operator's responsibilities include developing and implementing the Health and Safety Management Plan (TAH-HSEC-00189) that is used as the primary means of ensuring, so far as is reasonably practicable that the above discussed PCBU duty of care.

Details regarding the compliance with the relevant requirements of the WHS Regulations and WHSMP Regulations are provided in **Table 3-5**, as well as being discussed in the PSMP.

### Subsidence as a Principal Hazard

According to Clause 5 of the WHSMP Regulation provides the definition of a principal hazard as:

> *"…any activity, process, procedure, plant, structure, substance, situation or other circumstance*
> *relating to the carrying out of:*
>
> *(a) mining operations that have a reasonable potential to result in multiple deaths in a single incident or a series of recurring incidents in relation to any of the following:*
> *(vi) subsidence,"*

In accordance with Table 1 in Condition 13A of DA 67/98, all first workings for Longwalls 33 (equivalent to LW W1) and subsequent longwalls are required to be designed to remain stable and non-subsiding in the long-term, except insofar as they may be impacted by approved second workings. While it is not considered that there is reasonable potential for a subsidence incident to cause multiple fatalities, Tahmoor Coal has prepared this Extraction Plan generally in accordance with the relevant WHS legislation and guidelines as outlined further below and detailed in **Table 3-5** and the PSMP.

Under Clauses 23(1) and 23(2) of the WHSMP Regulation, the Mine Operator must identify all principal mining hazards associated with mining operations and conduct a risk assessment in relation to each principal hazard identified that involves a comprehensive and systematic investigation and analysis of all aspects of risk to health and safety associated with each principal hazard. Tahmoor Coal has prepared a risk assessment to identify and assess principal hazards and controls in relation to subsidence as discussed further in **Section 4.2**, **Table 3-5**, and the PSMP.

**Table 3-5 Work Health and Safety Legislation Compliance**

| WHS Legislation and Clause | Condition Requirement | Section Addressed |
|---|---|---|
| **WHS Regulations** | | |
| Clause 34 | **Duty to identify hazards**<br>A duty holder, in managing risks to health and safety, must identify reasonably foreseeable hazards that could give rise to risks to health and safety. | Section 4.2<br>PSMP |
| Clause 35 | **Managing risks to health and safety**<br>A duty holder, in managing risks to health and safety, must:<br>(a) eliminate risks to health and safety so far as is reasonably practicable, and<br>(b) if it is not reasonably practicable to eliminate risks to health and safety, minimise those risks so far as is reasonably practicable. | Section 3.6<br>Section 6 of WMP, LMP, BMP and HMP. |
| Clause 36 | **Hierarchy of control measures**<br>(1) This clause applies if it is not reasonably practicable for a duty holder to eliminate risks to health and safety.<br>(2) A duty holder, in minimising risks to health and safety, must implement risk control measures in accordance with this clause. | Section 4.2, Section 3.6<br>PSMP<br>Section 6 of WMP, LMP, BMP and HMP. |

| WHS Legislation and Clause | Condition Requirement | Section Addressed |
|---|---|---|
| | (3) The duty holder must minimise risks, so far as is reasonably practicable, by doing 1 or more of the following:<br>(a) substituting (wholly or partly) the hazard giving rise to the risk with something that gives rise to a lesser risk,<br>(b) isolating the hazard from any person exposed to it,<br>(c) implementing engineering controls.<br>(4) If a risk then remains, the duty holder must minimise the remaining risk, so far as is reasonably practicable, by implementing administrative controls.<br>(5) If a risk then remains, the duty holder must minimise the remaining risk, so far as is reasonably practicable, by ensuring the provision and use of suitable personal protective equipment.<br>Note. A combination of the controls set out in this clause may be used to minimise risks, so far as is reasonably practicable, if a single control is not sufficient for the purpose. | |
| Clause 37 | **Maintenance of control measures**<br>A duty holder who implements a control measure to eliminate or minimise risks to health and safety must ensure that the control measure is, and is maintained so that it remains, effective, including by ensuring that the control measure is and remains:<br>(a) fit for purpose, and<br>(b) suitable for the nature and duration of the work, and<br>(c) installed, set up and used correctly. | Section 3.6<br>Section 6 of WMP, LMP, BMP and HMP. |
| Clause 38 | **Review of control measures**<br>(1) A duty holder must review and as necessary revise control measures implemented under this Regulation so as to maintain, so far as is reasonably practicable, a work environment that is without risks to health or safety.<br>(2) Without limiting subclause (1), the duty holder must review and as necessary revise a control measure in the following circumstances:<br>(a) the control measure does not control the risk it was implemented to control so far as is reasonably practicable,<br>(b) before a change at the workplace that is likely to give rise to a new or different risk to health or safety that the measure may not effectively control,<br>(c) a new relevant hazard or risk is identified,<br>(d) the results of consultation by the duty holder under the Act or this Regulation indicate that a review is necessary,<br>(e) a health and safety representative requests a review under subclause (4). | Section 4.2, Section 3.6<br>PSMP<br>Section 6 of WMP, LMP, BMP and HMP. |

| WHS Legislation and Clause | Condition Requirement | Section Addressed |
|---|---|---|
| | (3) Without limiting subclause (2) (b), a change at the workplace includes:<br>(a) a change to the workplace itself or any aspect of the work environment, or<br>(b) a change to a system of work, a process or a procedure.<br>(4) A health and safety representative for workers at a workplace may request a review of a control measure if the representative reasonably believes that:<br>(a) a circumstance referred to in subclause (2) (a), (b), (c) or (d) affects or may affect the health and safety of a member of the work group represented by the health and safety representative, and<br>(b) the duty holder has not adequately reviewed the control measure in response to the circumstance. | |
| **WHSMP Regulations** | | |
| Clause 9 | **Management of risks to health and safety (cl 617 model WHS Regulations)**<br>(1) A person conducting a business or undertaking at a mine must manage risks to health and safety associated with mining operations at the mine in accordance with Part 3.1 of the WHS Regulations.<br>(2) A person conducting a business or undertaking at a mine must ensure that a risk assessment is conducted in accordance with this clause by a person who is competent to conduct the particular risk assessment having regard to the nature of the hazard.<br>(3) In conducting a risk assessment, the person must have regard to:<br>(a) the nature of the hazard, and<br>(b) the likelihood of the hazard affecting the health or safety of a person, and<br>(c) the severity of the potential health and safety consequences.<br>(4) Nothing in subclause (3) limits the operation of any other requirement to conduct a risk assessment under this Regulation.<br>(5) A person conducting a business or undertaking at a mine (who is the mine operator of the mine or who is a contractor) must keep a record of the following:<br>(a) each risk assessment conducted under this clause and the name and competency of the person who conducted the risk assessment,<br>(b) the control measures implemented to eliminate or minimise any risk that was identified through any such risk assessment.<br>(6) A person conducting a business or undertaking at a mine is not required to keep a record of a risk assessment if: | Section 4.2<br>PSMP |

| WHS Legislation and Clause | Condition Requirement | Section Addressed |
|---|---|---|
| | (a) the risk assessment is one that an individual worker is required to carry out before commencing a particular task, and<br>(b) the person keeps a record of risk assessments that addresses the overall activity being undertaken (of which the task forms a part) such as risk assessments carried out in relation to the development of the safety management system for the mine or for a principal mining hazard management plan.<br>(7) The record kept under subclause (5):<br>(a) if kept by a mine operator—forms part of the safety management system of the mine and the records of the mine, or<br>(b) if kept by a contractor who has prepared a contractor health and safety management plan—forms part of the plan. | |

| WHS Legislation and Clause | Condition Requirement | Section Addressed |
|---|---|---|
| Clause 10 | **Review of control measures (cl 618 model WHS Regulations)**<br>(1) A person conducting a business or undertaking at a mine must review and as necessary revise control measures implemented under clause 9 in the following circumstances:<br>(a) an audit of the effectiveness of the safety management system for the mine indicates a deficiency in a control measure,<br>(b) a worker is moved from a hazard or assigned to different work in response to a recommendation contained in a health monitoring report provided under Part 3,<br>(c) an incident referred to in clause 128 occurs,<br>(d) any other incident occurs that is required to be notified to the regulator under the WHS laws.<br>(2) The mine operator of a mine must ensure that a control measure that is the subject of a request by a health and safety representative under clause 38 (4) of the WHS Regulations is reviewed and as necessary revised, whether the request is made to the mine operator or notified to the mine operator under subclause (3) by another person conducting a business or undertaking at the mine.<br>(3) A person conducting a business or undertaking at the mine who is not the mine operator of the mine must immediately notify the mine operator of a request made to the person under clause 38 (4) of the WHS Regulations.<br>(4) A health and safety representative for workers at the mine may request a review of a control measure under clause 38 (4) of the WHS Regulations as if the circumstances referred to in subclause (1) were included as a circumstance in clause 38 (4) (a) of the WHS Regulations. | Section 4.2, Section 6.1, Section 6.2<br>PSMP |
| Clause 23 | **Identification of Principal Mining Hazard Management Plan**<br>(1) The mine operator of a mine must identify all principal mining hazards associated with mining operations at the mine.<br>(2) The mine operator must conduct, in relation to each principal mining hazard identified, a risk assessment that involves a comprehensive and systematic investigation and analysis of all aspects of risk to health and safety associated with the principal mining hazard.<br>(3) The mine operator, in conducting a risk assessment under subclause (2), must: | Section 4.2<br>PSMP |

| WHS Legislation and Clause | Condition Requirement | Section Addressed |
|---|---|---|
| | (a) use investigation and analysis methods that are appropriate to the principal mining hazard being considered, and consider the principal mining hazard individually and also cumulatively with other hazards at the mine. | |
| Clause 24 | **Preparation of Principal Mining Hazard Management Plan**<br>(1) The mine operator of a mine must consider the following when preparing a principal mining hazard management plan for a principal mining hazard at the mine in accordance with this clause and Schedule 1.<br>(2) A principal mining hazard management plan must:<br>(a) provide for the management of all aspects of risk control in relation to the principal mining hazard, and<br>(b) so far as is reasonably practicable, be set out and expressed in a way that is readily understandable by persons who use it.<br>(3) A principal mining hazard management plan must:<br>(a) describe the nature of the principal mining hazard to which the plan relates, and<br>(b) describe how the principal mining hazard relates to other hazards associated with mining operations at the mine, and<br>(c) describe the analysis methods used in identifying the principal mining hazard to which the plan relates, and<br>(d) include a record of the most recent risk assessment conducted in relation to the principal mining hazard, and<br>(e) describe the investigation and analysis methods used in determining the control measures to be implemented, and<br>(f) describe all control measures to be implemented to manage risks to health and safety associated with the principal mining hazard, and<br>(g) describe the arrangements in place for providing the information, training and instruction required by clause 39 of the WHS Regulations in relation to the principal mining hazard, and<br>(h) refer to any design principles, engineering standards and technical standards relied on for control measures for the principal mining hazard, and<br>(i) set out the reasons for adopting or rejecting each control measure considered.<br>(4) The mine operator of a mine must consider the following when preparing a principal mining hazard management plan for a principal mining hazard at the mine: | The Principal Mining Hazard Management Plan for subsidence will be revised and updated to include LW W3-W4 prior to the commencement of extraction. |

| WHS Legislation and Clause | Condition Requirement | Section Addressed |
|---|---|---|
| | (a) the matters set out in Schedule 1 in respect of the principal mining hazard, and any other matter relevant to managing the risks associated with the principal mining hazard at the mine. | |
| Clause 67 | **Subsidence**<br>(1) In complying with clause 9, the mine operator of an underground coal mine must manage risks to health and safety associated with subsidence at the mine.<br>(2) Without limiting subclause (1), the mine operator must ensure that:<br>(a) so far as is reasonably practicable, the rate, method, layout, schedule and sequence of mining operations do not put the health and safety of any person at risk from subsidence, and<br>(b) monitoring of subsidence is conducted, including monitoring of its effects on relevant surface and subsurface features, and<br>(c) any investigation of subsidence and any interpretation of subsidence information is carried out only by a competent person, and<br>(d) all subsidence monitoring data is provided to the regulator in the form and at the times required by the regulator, and so far as is reasonably practicable, procedures are implemented for the effective consultation, co-operation and co-ordination of action with respect to subsidence between the mine operator and relevant persons conducting any business or undertaking that is, or is likely to be, affected by subsidence. | Section 3.3, Section 4.2, Section 5, Master TARP (Appendix D)<br>PSMP |
| Clause 128 | **Duty to notify regulator of certain incidents**<br>(1) The operator of a mine or petroleum site must take all reasonable steps to ensure that the regulator is notified in accordance with this clause after becoming aware of an incident (other than a notifiable incident) arising out of the carrying out of mining operations or petroleum operations at the mine or petroleum site, but only if the incident:<br>(a) results in illness or injury that requires medical treatment within the meaning of clause 13 of Schedule 9, or<br>(b) is a high potential incident.<br>(5) In this clause.<br>High potential incident means any indication from monitoring data of the development of subsidence which may result in any incident referred to in clause:<br>• 179 (a) (xvi) – a failure of ground, or of slope stability control measures, or<br>• 179 (a) (xvii) – rock falls, instability of cliffs, steep slopes or natural dams, occurrence of sinkholes, | Section 6.1, Master TARP (Appendix D)<br>PSMP |

| WHS Legislation and Clause | Condition Requirement | Section Addressed |
|---|---|---|
| | development of surface cracking or deformations or release of gas at the surface, due to subsidence, or<br>• 179 (a) (xvi) and (xvii)<br>These clauses are relevant only if a person could reasonably be expected to be present. | |
| Schedule 1<br>Subsidence<br>Clause 3C | **Principal Hazard Management Plans – additional matters to be considered**<br>*Subsidence*<br>The following matters must be considered in developing the control measures to manage the risks of subsidence:<br>(a) the characteristics of all relevant surface and subsurface features,<br>(b) the characteristics of all relevant geological, hydrogeological, hydrological, geotechnical, topographic and climatic conditions, including any conditions that may cause elevated or abnormal subsidence or the formation of sinkholes,<br>(c) the characteristics of any previously excavated or abandoned workings that may interact with any proposed or existing mine workings,<br>(d) the existence, distribution, geometry and stability of significant voids, standing pillars or remnants within any old pillar workings that may interact with any proposed or existing mine workings,<br>(e) the predicted and actual nature, magnitude, distribution, timing and duration of subsidence,<br>(f) the rate, method, layout, schedule and sequence of mining operations. | Subsidence Predictions and Impact Assessment Report (Appendix A)<br>Master TARP (Appendix D) |
| Schedule 3<br>Clause 16 | **High Risk Activities**<br>*Secondary extraction or pillar extraction, splitting or reduction*<br>(1) The following are identified as high risk activities:<br>(a) secondary extraction by longwall mining, shortwall mining or miniwall mining,<br>(b) pillar extraction,<br>(c) pillar splitting,<br>(d) pillar reduction.<br>(2) The waiting period for any such activity is 3 months.<br>(3) The information and documents that must be provided in relation to any such activity are as follows:<br>(a) details of the authoritative sources used in determining that the proposed method of work can be done safely,<br>(b) engineering plans showing the manner and sequence of extraction, endorsed by the individual nominated to exercise the statutory function of mining engineering manager at the mine,<br>(c) information about the land above or in the vicinity of the proposed activity including land use and details of | A High Risk Activity Notification, as required by WHS Regulation, will be submitted separately to this Extraction Plan, prior to the commencement of secondary extraction. |

| WHS Legislation and Clause | Condition Requirement | Section Addressed |
|---|---|---|
| | who owns or occupies any land that may be affected by subsidence,<br>(d) in the case of a pillar extraction, details of the procedures for the recovery of buried and immobile mining plant in or around a goaf,<br>(e) details of how the risks to the health and safety of workers and other persons from subsidence caused by the activity will be managed. | |

### Principal Hazard Management Plan

Under Clause 24 of the WHSMP Regulation, the Mine Operator must prepare a Principal Hazard Management Plan for each principal hazard associated with mining operations in accordance with Clause 24 and Schedule 1. The Principal Hazard Management Plan for subsidence will be revised and updated to include LW W3-W4 prior to the commencement of secondary extraction of LW W3.

### High Risk Activity

A Mine Operator must give notice of a High Risk Activity to the regulator and ensure that the requirements of Clause 33 and Schedule 3 of the WHSMP Regulation are complied with. In Schedule 3 of the WHSMP Regulation, there are three High Risk Activities that relate to subsidence:

- Clause 16 – Secondary extraction or pillar extraction, splitting or reduction;
- Clause 17 – Shallow depth of cover mining; and
- Clause 28 – Highwall mining.

Mining of LW W3-W4 involves secondary extraction, therefore it is considered a High Risk Activity under Schedule 3, Clause 16 of the WHSMP Regulation. A High Risk Activity Notification, as required by WHS Regulation, will be submitted separately to this Extraction Plan, prior to the commencement of secondary extraction of LW W3.

It is noted that Clause 17 and Clause 18 do not apply to the extraction of LW W3-W4.

### Managing Risks of Subsidence Guide: WHS (Mines and Petroleum Sites) Legislation

To assist Mine Operators in complying with their obligations under the WHS laws relevant to subsidence, the Resources Regulator released the document Managing Risks of Subsidence Guide: WHS (Mines and Petroleum Sites) Legislation (Resources Regulator, 2017). This Extraction Plan has been prepared in accordance with the requirements of the Guideline.

Section 2.2.2 of the Managing Risks of Subsidence Guideline lists the surface and subsurface features which could give rise to risks to health and safety, if the features are affected by subsidence. The surface and subsurface features include:

- Public utilities (e.g. highways, railways, tunnels, bridges, air strips, electrical transmission infrastructure or pressurised gas pipelines);
- Public amenities (e.g. shopping centres, hospitals, churches, sport facilities, child care centres or schools);
- Built features other than public utilities and amenities (e.g. dwellings, factories, workshops, privately owned gas storages or surface mining voids or facilities); and

- Natural features (e.g. cliffs, steep slopes, natural caves or dams or surface of land), where subsidence may result in hazardous conditions due to instability of rock or soil masses, rock falls, landslide, fractures, sinkholes, inundation, gas release or pollution of drinking water.

A summary of the relevant natural and built features that may pose a risk to public safety, the WHS risk assessment undertaken, and the management and monitoring of subsidence in relation to public safety is addressed in the PSMP.

### 3.2.5 Extraction Plan Guidelines

This Extraction Plan has been prepared in accordance with the DPIE *Draft Guidelines for the Preparation of Extraction Plans V5* (DPE, 2015), as summarised in **Table 3-6**.

**Table 3-6 Relevant Extraction Plan Guideline Requirements**

| Extraction Plan Guideline | Section Detail | Section Addressed |
|---|---|---|
| 1. Title block | A title block should be included at the beginning of the Extraction Plan, which contains the:<br>• name of the applicant company;<br>• name of mine;<br>• development consent and mining lease reference numbers;<br>• Extraction Plan title, date and reference number; and<br>• the signature(s) of person(s) taking responsibility for the accuracy and comprehensiveness of the information contained within the plan, including an authorised representative of the lease holder and the mine manager (for the purposes of relevant safety legislation). | Page ii |
| 2. Development of the Plan | The process of development of the Extraction Plan should be described. Most importantly, this section should address consultation undertaken by the Applicant with affected agencies and other key stakeholders, such as the owners and/or operators of both publicly and privately-owned land and infrastructure and the mine's Community Consultative Committee.<br>This section should also describe the process of reviewing and updating the predictions of subsidence effects, subsidence impacts and environmental consequences used in previous environmental impact assessment or environmental management plan documentation relied upon by the Applicant (eg the predictions in any previous Environmental Impact Statement and/or the predictions in any previous Extraction Plan or SMP Application). | Section 2 |
| 3. Overview | The overview section is an essential introduction to the Extraction Plan. It should accurately describe:<br>• Mine planning and design;<br>• Subsidence predictions;<br>• Performance objectives and other regulatory requirements; and | Section 3 |

| Extraction Plan Guideline | Section Detail | Section Addressed |
|---|---|---|
| | • Subsidence management strategies and measures. | |
| 4. Key component plans: | The main body of the Extraction Plan primarily comprises a set of six key component plans. It is appropriate that these are presented in a particular order, even if some of the later plans deserve a particular priority due to local circumstances (eg the Built Features or Heritage Management Plans). The preferred order for these component plans is as follows:<br>• Water Management Plan;<br>• Land Management Plan;<br>• Biodiversity Management Plan;<br>• Heritage Management Plan;<br>• Built Features Management Plan; and<br>• Public Safety Management Plan.<br>All six key component plans should give appropriate consideration to risk assessment and risk management. | Section 4<br>Volumes 2-4 – Key Component Plans and Supporting Documents |
| 5. Subsidence Monitoring Program | The key component plans should be followed by a Subsidence Monitoring Program. This program should address two purposes. The first is to set out the program for monitoring the *subsidence effects* associated with the proposed coal extraction. The second is to summarise and consolidate the various environmental monitoring programs presented in each of the key component plans. These environmental monitoring programs should be directed towards monitoring the *subsidence impacts* and environmental consequences of mine subsidence. | Section 5<br>Volume 4 – Subsidence Monitoring Program |
| 6. Implementation | This section of the Extraction Plan should address all key elements of how the plan is going to be implemented, including reporting, regular review and key responsibilities. This section should follow the structure set out below:<br>• Reporting Framework;<br>• Review of the Extraction Plan;<br>• Review of other Management Plans; and<br>• Key Responsibilities. | Section 6 |
| 7. Graphical Plans | The following plans are required as part of the application:<br>• Plan 1<br>• Plan 2<br>• Plan 3<br>• Plan 4 (not required)<br>• Plan 5<br>• Plan 6<br>• Plan 7<br>• Plan with aerial photography | Section 7<br>Volume 5 – Graphical Plans |
| 8. Attachments to the Extraction Plan | All other material necessary to support the Extraction Plan should be included as Attachments or Appendices. | Appendices A-E |

## 3.3 Mine Planning and Design

### 3.3.1 Proposed Mining Method

First workings (primary extraction or development mining) for LW W3-W4 utilises continuous miners and shuttle cars to develop roadways, which form the longwall panels. First workings for LW W3 commenced in August 2020.

Development mining equipment required for first workings includes, but is not limited to:

- Continuous miners;
- Shuttle cars;
- Breaker feeders;
- Auxiliary fans;
- Graders;
- Underground personnel transporters; and
- Underground load haul dumps.

Second workings (secondary extraction or longwall mining) for LW W3-W4 will utilise longwall retreat mining method to extract coal from the Bulli Coal Seam. Longwall mining is supported by continuous miner development operations. Each panel will progress in a direction towards the main headings, working north to south.

Longwall mining equipment required for second workings includes, but is not limited to:

- Longwall shearer – to cut coal from the face of the seam;
- Face conveyor – to collect sheared coal and carry it to a coal sizer and stage loader;
- Panel conveyor – to transfer the coal to a trunk conveyor in one of the main headings; and
- Hydraulic roof supports – to temporarily hold up the roof strata to provide a working space for the shearing machinery and face conveyor. After each slice of coal is removed, the hydraulic roof supports, face conveyor and shearing machinery are moved forward and the roof immediately above the seam is allowed to collapse into the void that is left as the face retreats (the goaf).

ROM coal from Tahmoor Mine is conveyed to the surface via a series of conveyor belts and discharged to the ROM Stockpile area, where the coal is reclaimed and transferred to the Coal Handling Preparation Plant. At the plant, the ROM coal is processed by crushing, washing, sizing and dewatered and then transferred to the product coal stockpile by conveyor. Product Coal is reclaimed and transferred by conveyors to the Rail Load Out Bin, and then loaded into rail coal wagons for transport to either Port Kembla or the Port of Newcastle by rail.

Coal is mined from within the Bulli Coal Seam, producing hard coking coal for steel production. Product coal is marketed to Australian domestic customers and export customers.

### 3.3.2 Mine Design

#### Variations to the Approved Mine Plan

As discussed in **Section 1.1,** the Western Domain mine plan has been refined over time since the approved 1993 EIS (Kembla Coal and Coke, 1993) and the approved 1998 EIS (Olsen Environmental Consulting, 1998).

The mine plan for the Western Domain presented within the 2014 LW 31-37 SMP Application (Glencore, 2014) was further reviewed and refined during 2017. This mine design review resulted in re-orientation of longwalls in the Western Domain from a north-west to south-east orientation to a north to south orientation to avoid mining directly under streams of third order or above.

These design changes were implemented to reduce subsidence-related impacts to Matthews Creek, Cedar Creek and Stonequarry Creek, which are located along the western and northern areas of the Western Domain. Stonequarry Creek is the closest creek to LW W3-W4, and is located approximately 120 m north of the commencing end of LW W3. The mine plan design minimises subsidence impact risks to surface water, aquatic habitat, and Aboriginal heritage sites located along these creeks.

The length of LW W4 was also significantly reduced by changing the commencing position to avoid subsidence impacts to critical rail infrastructure, in particular the Picton Tunnel on the MSR.

### Mining Geometry

LW W3-W4 are to be developed north of the main headings, will be orientated in a north to south direction, and will be mined from north to south (**Figure 3-1**). LW W3 will be mined first, followed by LW W4.

The proposed layout for LW W3-W4 is within the footprint of the Limit of Subsidence as assessed in the 1998 EIS (Olsen Environmental Consulting, 1998).

The proposed dimensions of LW W3-W4 are outlined in **Table 3-7**. Detailed mine layout drawings are provided in **Volume 5** of this Extraction Plan including the Plans 1 to 7, as required under the DPIE *Draft Extraction Plan Guidelines V5 (*DPE, 2015).

The LW W3-W4 panels will be 283 m (LW W3) and 285 m (LW W4) in width. The length of the longwalls will be 1544 m for LW W3 and 996 m for LW W4 (excluding first workings). The overall void length is approximately 8 m greater than the longwall extraction length, owing to the installation headings.

**Table 3-7 Geometry of LW W3-W4**

| Longwall Panel Parameters | Units | LW W3 | LW W4 |
|---|---|---|---|
| ROM Coal Extracted | tonnes | 1,568,548 | 993,760 |
| Gate Road Width | m | 5.2 | 5.2 |
| Gate Road Height | m | 2.7 | 2.7 |
| Maingate (MG) Chain Pillar Width | m | 44 (1 to 12)<br>37 (12 to 13)<br>30 (13 to 18) | 25 |
| Tailgate (TG) Chain Pillar Width | m | 39 | 44 |
| Pillar Width/Height Ratio | | 14.4 | 9.5 |
| Tailgate (TG) Chain Pillar Length | m | 101 | 105 |
| Longwall Void Width | m | 283 | 285 |
| Longwall Extraction Width | m | 272.6 | 274.6 |
| Longwall Void Length | m | 1,552 | 1,004 |
| Longwall Extraction Length | m | 1,544 | 996 |
| Longwall Extraction Height | m | 2.15 | 2.15 |
| Coal Seam thickness | m | 2.00 | 2.10 |

| Longwall Panel Parameters | Units | LW W3 | LW W4 |
|---|---|---|---|
| Minimum Depth of Cover | m | 480 | 500 |
| Maximum Depth of Cover | m | 540 | 540 |

### 3.3.3 Geological Information

Detailed information on the geology, stratigraphy, lithology, geological structure and geotechnical considerations are outlined in the Coal Resource Recovery Plan contained within **Appendix C**.

It is noted that no significant geological structures have been identified within the Western Domain from underground workings by Tahmoor Coal. Two small faults have been encountered to date in the roadway development for LW W1 and LW W2, with approximate displacement of <0.05 m.

The Nepean Fault encountered at Tahmoor Mine is part of the regional Nepean Fault system. The Nepean Fault is located east of the LW W3-W4 mining area, approximately 500 m from the edge of LW W4.

This system is the southern extension of the Lapstone Monocline, and at Tahmoor, it consists of closely spaced sub-vertical en-echelon faults in a zone up to 400 m wide. The net displacement of the faults is approximately 30 m at Picton, diminishing to 10 m at Tahmoor North, and 3 m in Tahmoor South. The Nepean Fault Zone is the only hydraulically charged geological structure encountered during mining to date.

### 3.3.4 Existing Workings

Tahmoor Coal has extracted coal from the Bulli Coal Seam through the operation of Tahmoor Mine since 1979. Tahmoor Mine has included the following longwall series:

- Longwalls 1 to 9 – mined from 1987 to 1992, with widths from 170 m to 200 m (void width) and length up to 1640 m;
- Longwalls 10 to 21 – mined from 1992 to 2004, with widths from 230 m to 235 m (void width) and lengths up to 2675 m;
- Longwalls 22 to 32 – mined from 2005 to 2019, with widths from 283 m to 285 m (void width) and lengths up to 3580 m. This longwall series was orientated in a north-west to south-east direction, and progressively mined from west to east; and
- Longwalls West 1 and West 2 – mined from 2019 to present, with widths of 283 m (void width) and lengths up to 1875 m. These longwalls are located in the Western Domain and are orientated in a north to south direction, and progressively mined from west to east.

The mine is comprised of a five heading mains development configuration and numerous two heading gate road developments to establish the main and tailgates for the corresponding headwalls. Long-term mains development pillars are designed to be long-term stable and not cause subsidence, resulting in serviceable roads for the life of the mine. Gate road pillars are designed to exceed one-tenth of the overburden depth and are serviceable up until extraction.

Existing workings for both development and secondary extraction are identified in **Figure 3-1** and AO Graphical Plans 1-7 in **Volume 5**.

LW W3-W4 are located in the Western Domain and will be part of a new longwall series to the north-west of the previously mined longwalls of Tahmoor Mine.

Tahmoor Mine is surrounded by numerous operating and discontinued coal mines that also target the Bulli Coal Seam. These mines include South32's Bulli Seam Operations, Russell Vale Mine, and Cordeaux Mine. South32's Dendrobium Mine is situated to the south-east of Tahmoor Mine and targets the deeper Wongawilli Coal Seam (SLR, 2021).

### 3.3.5 Mine Schedule

An indicative mining schedule for development and secondary extraction within the LW W3-W4 Extraction Plan Study Area is provided in **Table 3-8**.

Mining of LW W3-W4 is scheduled to commence in September 2021 and be completed September 2022. Mining of LW W3 is scheduled to be extracted over seven months and LW W4 over four months.

Development rates are budgeted to average between 8 m to 14 m per continuous miner shift, depending on geological conditions and support regime. Longwall extraction will typically produce in the order of 4300 tonnes per shift (average 60,000 tonnes per week). Tahmoor Coal operates seven days a week, 24 hours a day on a roster basis.

**Table 3-8 Mine Schedule for LW W3-W4**

| Longwall Panel | Estimated Start Date | Estimated Duration | Estimated Completion Date |
|---|---|---|---|
| Longwall West 3 | 7/9/2021 | 201 days (7 months) | 25/3/2022 |
| Longwall West 4 | 22/4/2022 | 133 days (4 months) | 2/9/2022 |

### 3.3.6 Resource Recovery

Tahmoor Coal is proposing to use the longwall mining method to extract coal from the two longwall panels and the development of the main headings. Expected longwall resource recovery from the Extraction Plan Study Area is presented in **Table 3-9**.

The Bulli Coal Seam has an average thickness of 2.00 m for LW W3 and 2.10 m for LW W4.

Longwall equipment is able to cut up to a maximum seam height of 2.15 m, therefore the full seam thickness will be mined. The total recoverable reserve from the extraction area is 2,562 309 tonnes for LW W3-W4.

**Table 3-9 Estimated Individual Panel Tonnages and Recovery**

| Longwall | Development tonnes (t) | Longwall tonnes (t) | Total tonnes (t) | Recovery |
|---|---|---|---|---|
| LW W3 | 138,778 | 1,568,549 | 1,707,327 | 100% of Extraction Plan Area with 69% Yield |
| LW W4 | 96,885 | 993,760 | 1,090,645 | 100% of Extraction Plan Area with 74% Yield |

The proposed extraction of LW W3-W4 has no detrimental impact on the potential to mine economically recoverable coal in the remainder of the lease areas. Tahmoor Mine's overall longwall planning strategy targets summarized resource recovery within the identified constraints and the geotechnical and geological characteristics of the lease areas.

## 3.4 Subsidence Predictions and Observations

### 3.4.1 Overview

Key parameters used in the description, prediction and assessment of surface movements resulting from underground mining are subsidence, tilt, strain, curvature, valley closure, and upsidence. A glossary of subsidence terms is provided in **Section 8.3** of this Extraction Plan Main Document.

Subsidence predictions for the extraction of LW W3-W4 have been presented in the Subsidence Predictions and Impact Assessment Report by MSEC (2021; refer to **Appendix A**). The following sections provide a summary of the information contained in the report (MSEC, 2021) to provide the maximum predicted conventional subsidence parameters resulting from the extraction of the proposed LW W3-W4 in the Bulli Coal Seam.

The predicted subsidence, tilt and curvature have been obtained using the Incremental Profile Method, which has been calibrated for local conditions. The predicted strains have been determined by analysing the strains measured at Tahmoor Mine and other mines in the NSW Coalfields where the longwall width-to-depth ratios and extraction heights are similar to those for the proposed longwalls. A summary of subsidence predictions methods used to predict subsidence parameters for the extraction of LW W3-W4 is provided in **Section 2.2.2**, and are discussed in further detail in the Subsidence Prediction s Report (MSEC, 2021; **Appendix A**).

The maximum predicted subsidence parameters and the predicted subsidence contours describe and show the conventional movements. These predicted subsidence parameters do not include non-conventional movements such as valley related upsidence and closure movements, nor the effects of faults and other geological structures. Such effects have been addressed separately in the Subsidence Predictions and Impact Assessment Report for each environmental and built feature provided in Chapters 5 and 6 of **Appendix A**.

Subsidence impact predictions have been used in the various Key Component Plans and associated documents to determine the appropriate management of the relevant environmental and built features. **Table 3-1** provides a summary of the environmental and built features considered and the relevant Key Component Plans and associated documents that discuss and manage these features.

### 3.4.2 First Workings

The underground workings proposed are consistent with the proven success of the pillar geometries previously employed at Tahmoor Mine over a period of 32 years. Roof stratigraphy and floor conditions are well understood and controlled by the established roadway reinforcement systems. Coal strength, from the pillar stability point of view, is expected to be undiminished in the Extraction Plan Study Area and is complemented by rib bolting where necessary.

The parameters used for first workings at Tahmoor Coal Mine are width of 5.2 m and height of 2.7 m. The design parameters for first workings utilised at Tahmoor Mine are below the criteria for a High Risk Activity notification, as outlined within Schedule 3, Part 2, Clause 12 of the WHSMP Regulations.

The first workings for LW W3-W4 are expected to be long term stable and non-subsiding in accordance with the requirements of DA 67/98 Condition 13A Table 1. Further information on first workings is provided in the Coal Resource Recovery Plan (**Appendix C**).

### 3.4.3 Subsidence Prediction

A summary of the maximum predicted values of incremental vertical subsidence, tilt and curvature resulting from the proposed LW W3-W4 are provided in **Table 3-10**. The incremental parameters represent the additional movements due to the extraction of each of the proposed longwalls. The predicted incremental vertical subsidence contours are shown in Drawings Nos. MSEC1112-25 to MSEC1112-26 in **Appendix A**.

**Table 3-10 Maximum Predicted Increment Conventional Subsidence, Tilt and Curvature for the Proposed LW W3-W4**

| Longwall | Maximum Predicted Incremental Vertical Subsidence (mm) | Maximum Predicted Incremental Tilt (mm/m) | Maximum Predicted Incremental Hogging Curvature ($km^{-1}$) | Maximum Predicted Incremental Sagging Curvature ($km^{-1}$) |
|---|---|---|---|---|
| LW W3 | 650 | 4.5 | 0.05 | 0.09 |
| LW W4 | 600 | 4.5 | 0.05 | 0.08 |

A summary of the maximum predicted values of total vertical subsidence, tilt and curvature resulting from the extraction of the proposed longwalls is provided in **Table 3-11**. The predicted total parameters represent the accumulated movements due to the extraction of all proposed longwalls within each of the mining areas. The predicted total vertical subsidence contours are shown in Drawings Nos. MSEC1112-27 to MSEC1112-29 of **Appendix A**.

**Table 3-11 Maximum Predicted Total Conventional Subsidence, Tilt and Curvature for the Proposed LW W3-W4**

| Longwall | Maximum Predicted Total Conventional Subsidence (mm) | Maximum Predicted Total Conventional Tilt (mm/m) | Maximum Predicted Total Conventional Hogging Curvature ($km^{-1}$) | Maximum Predicted Total Conventional Sagging Curvature ($km^{-1}$) |
|---|---|---|---|---|
| LW W3 | 950 | 5.0 | 0.06 | 0.10 |
| LW W4 | 1025 | 5.0 | 0.06 | 0.10 |

The maximum predicted total vertical subsidence of 1025 mm represents 49 % of the proposed mining height of 2.1 m. The maximum predicted total tilt is 5.0 mm/m (i.e. 0.5 %, or 1 in 200) and it occurs adjacent to the main gate of LW W4. The maximum predicted total curvatures are 0.06 $km^{-1}$ hogging and 0.10 $km^{-1}$ sagging, which represent minimum radii of curvature of 17 km and 10 km, respectively.

The predicted conventional subsidence parameters vary across the mining area. To illustrate this variation, the predicted profiles of vertical subsidence, tilt and curvature have been determined along two prediction lines. The predicted profiles of total vertical subsidence, tilt and curvature along Prediction Lines 1 and 2 are shown in Figs. C.01 and C.02, respectively, in Appendix C of **Appendix A**. The locations of these prediction lines are shown in Drawings Nos. MSEC1112-25 to MSEC1112-30 in **Appendix A**.

The proposed LW W3-W4 will be extracted in a new series following on from LW W1-W2 in the Western Domain. This new series is separated from LWs 22 to 32 by a barrier of unmined coal, except for development headings. Additional vertical settlement has been observed at Tahmoor Mine in locations above solid intact coal between previously extracted areas. While observed subsidence may exceed predictions above the coal barrier between proposed LW W3-W4 and the previous series of LWs 22 to 32, subsidence monitoring has shown that it is usually accompanied by relatively low conventional tilts, curvature and strains (less than 0.5 mm/m and usually within survey tolerance).

### 3.4.4 Strain Prediction

For features that are in discrete locations, such as building structures, farm dams and archaeological sites, it is appropriate to assess the frequency of the maximum strains measured in individual survey bays.

#### Strain Measured in Survey Bays

The survey database has been analysed to extract the maximum tensile and compressive strains that have been measured at any time during the extraction of the previous longwalls at the mine, for survey bays that were located directly above goaf or the chain pillars that are located between the extracted longwalls, which has been referred to as “above goaf”.

The 95 % confidence levels for the maximum total strains that the individual survey bays above goaf experienced at any time during mining were 1.0 mm/m tensile and 1.7 mm/m compressive. The 99 % confidence levels for the maximum total strains that the individual survey bays above goaf experienced at any time during mining were 1.5 mm/m tensile and 3.3 mm/m compressive.

The survey database has also been analysed to extract the maximum tensile and compressive strains that have been measured at any time during the extraction of the previous longwalls at the mine, for survey bays that were located outside and within 250 m of the nearest longwall goaf edge, which has been referred to as “above solid coal”.

The 95 % confidence levels for the maximum total strains that the individual survey bays above solid coal experienced at any time during mining were 0.6 mm/m tensile and 0.5 mm/m compressive. The 99 % confidence levels for the maximum total strains that the individual survey bays above solid coal experienced at any time during mining were 1.0 mm/m tensile and 0.8 mm/m compressive.

#### Strain Measured along Whole Monitoring Lines

For linear features such as roads, cables and pipelines, it is more appropriate to assess the frequency of the maximum strains measured along whole monitoring lines, rather than for individual survey bays. That is, an analysis of the maximum strains measured anywhere along the monitoring lines, regardless of where the strain occurs.

A total of 39 of the 68 monitoring lines (i.e. 57 %) had recorded maximum total tensile strains of 1.0 mm/m, or less, and that 63 monitoring lines (i.e. 93 %) had recorded maximum total tensile strains of 2.0 mm/m, or less. In addition, 47 of the 68 monitoring lines (i.e. 69 %) had recorded maximum compressive strains of 2.0 mm/m or less, and that 60 of the monitoring lines (i.e. 88 %) had recorded maximum compressive strains of 4.0 mm/m, or less.

**Shear Strains**

The 95 % and 99 % confidence levels for the maximum total horizontal mid-ordinate deviation that the individual survey marks located above goaf experienced at any time during mining were 23 mm and 39 mm, respectively.

### 3.4.5 LW W1-W2 Observed Subsidence and implications for LW W3-W4 Predicted Subsidence

Ground surveys during the mining of LW W1 have found that subsidence has been substantially less than predicted (approximately 50%). The experience is new for Tahmoor Mine but it has been previously observed at nearby longwalls at Appin Colliery, including LW901 and the southern section of LW703. Observed tilts were also lower than predicted (MSEC, 2021).

A comparison between measured and predicted profiles of vertical subsidence along the PMLL after the mining of LW W1 are provided in **Figure 3-2.**

As of March 2021, when approximately 730 metres of LW W2 had been extracted, subsidence surveys above LW W2 have measured less subsidence than predicted (refer to **Figure 3-3**). The majority of subsidence above the commencing end of LW W2 is expected to have developed at this length of extraction (MSEC, 2021).

Whilst observed subsidence above LW W1 and LW W2 was less than predicted, subsidence due to the extraction of LW W3-W4 may not follow the same pattern and return to typical predicted levels. Subsidence may also be greater than predicted (MSEC, 2021).

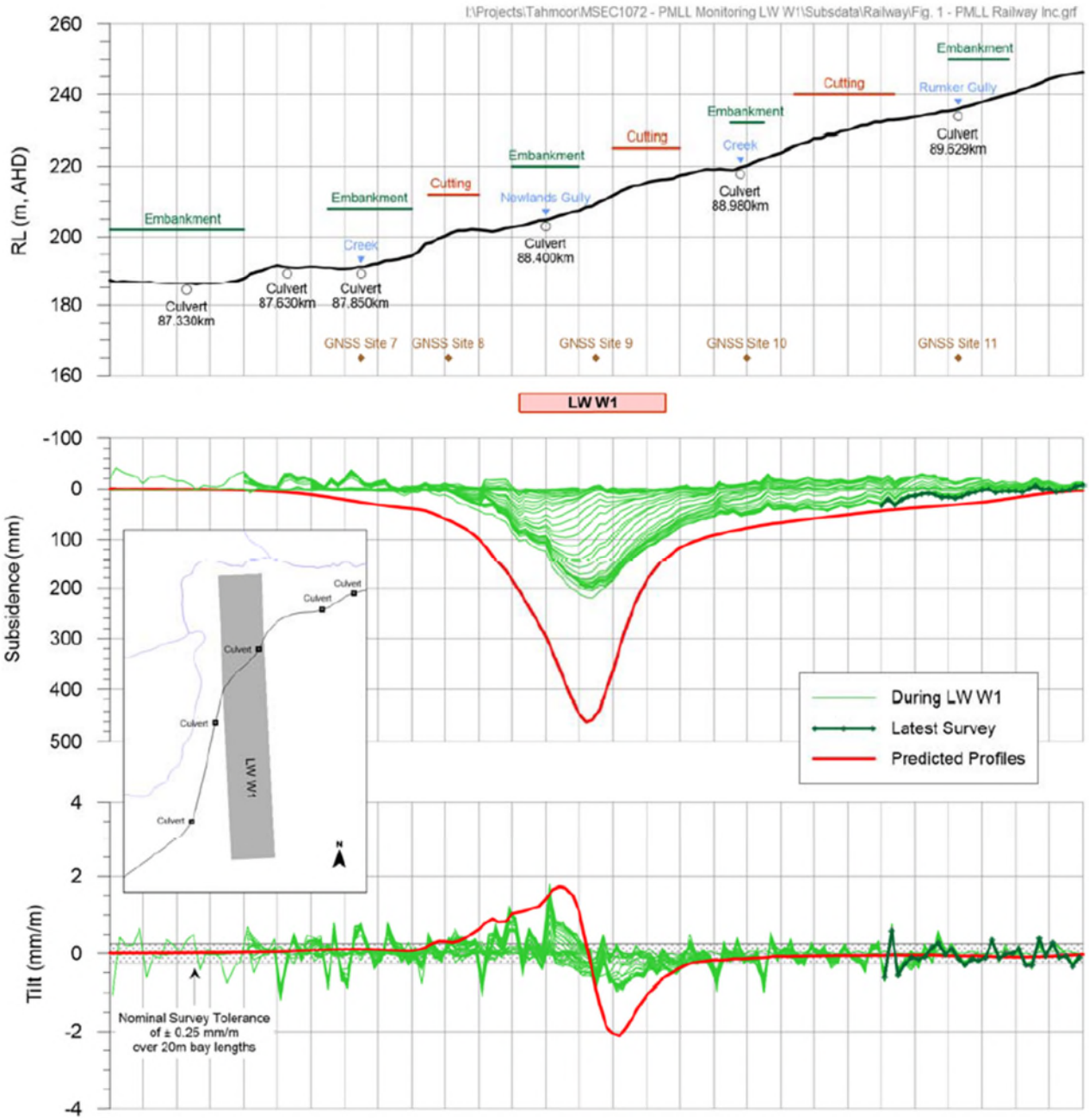



**Figure 3-2 Comparison between measured and predicted subsidence and tilt profiles along Picton-Mittagong Loop Line during the mining of LW W1 (MSEC, 2021).**

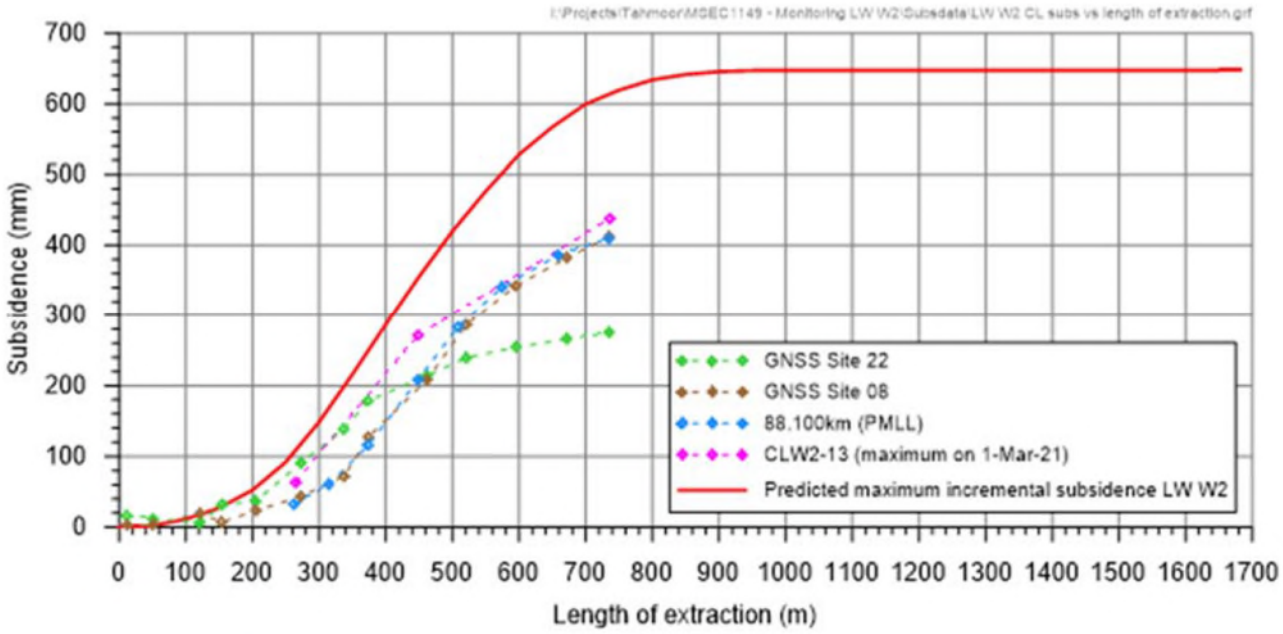



**Figure 3-3 Development of subsidence along centreline of LW W2 relative to length of longwall extracted (MSEC, 2021).**

### 3.4.6 Observed and Predicted Impacts in Waterways

#### Observed and Predicted Subsidence in Matthews and Cedar Creeks

The proposed extraction of LW W3-W4 is predicted to result in minor additional increases in subsidence, valley closure and upsidence along Matthews and Cedar Creeks. The predicted movements are in addition to movements that will have occurred previously due to the extraction of LW W1 (completed) and LW W2 (currently extracting). The majority of the movements for these creeks are predicted to occur during the mining of LW W1-W2. The predicted maximum additional movements due to the extraction of LW W3-W4 represent approximately 10 to 15% of the total maximum predicted movements due to LW W1-W4 (MSEC, 2021).

During extraction of LW W1 (completed) and LW W2 (currently extracting), ground surveys have not measured valley closure across Cedar and Mathews Creeks to the western side of LW W1. Ground extension has been measured across the tops of the valleys by the GNSS units. Water levels measured in Pool CR14 in Cedar Creek were, however, measured to have reduced below previously lowest levels in December 2020 and January 2021 during periods of dry weather (MSEC, 2021).

Visual inspections on 19 January 2021 found water levels were low in 7 pools from Pools CB10 to CB15 in Cedar Creek and Pools MR45 and M46 in Matthews Creek. The pools were subsequently observed to be full and overflowing in February 2021 after a series of rainfall events. No fracturing has been observed in the creeks, noting that the base of the pools cannot be inspected as they contain water and are covered with wet clay and sediment (MSEC, 2021).

A subsidence event notification for water level reduction in Pool CR14 between 19 to 29 January 2021 was provided to DPIE, Resources Regulator and NRAR on 23 February 2021. This water level reduction triggered a Level 4 TARP trigger for surface water level, in accordance with the LW W1-W2 Water Management Plan.

An investigation into the water level reduction at Pool CR14 has been completed, and a Surface Water and Groundwater Investigation Report was submitted to DPIE, Resources Regulator and NRAR on 9 April 2021. The key findings from the investigations for surface water were:

- Cedar Creek has likely experienced mining-induced horizontal and vertical movements when LW W1 was mined, and the magnitude of the movements are within subsidence predictions;
- Due to the timing of the installation of GNSS 20 and valley survey lines as a result of protracted negotiations for land access, it cannot be confirmed if valley closure during the mining of LW W1 and W2 (to late 2020) has occurred (reference GNSS 17 and GNSS 20), however the results demonstrate that changes due to the mining of LW W2 were very small in December 2020 and January 2021, when an atypical and significant decline in water levels was first recorded at pool CR14 (monitoring site CB) on Cedar Creek;
- There is evidence of a change in surface water characteristics in the reach of Cedar Creek within the Investigative Area. There is no evidence that mining-related influences have impacted surface water levels in Matthews Creek or Stonequarry Creek;
- Monitoring sites CC1A, CA and CB (Cedar Creek) experienced a significant change in recorded water level recessionary behaviour in December 2020, and in January 2021 at monitoring sites CA and CB;
- The pool water level decline is considered highly likely to be related to regional groundwater level decline associated with mining induced groundwater depressurisation, however further monitoring is required to confirm this;
- Whilst not visible on the surface, it is likely that mining induced subsidence has mobilised existing fractures resulting in changes in water level recession rates in pools CB3 (monitoring site CC1A), CB10 (monitoring site CA) and CR14 (monitoring site CB). However, these effects have only persisted at pool CB10 and pool CR14 and an additional period of monitoring data is required to confirm the longevity of these effects at these pools;
- It is hypothesised that pool CR14 (Cedar Creek) had transitioned from a gaining stream (baseflow discharge from the groundwater system to the stream) to a weakly gaining or losing stream (surface water recharge to the groundwater system) over the period mid-July to early December 2020 (as supported by the groundwater level records for P12A and P16A, which are in closest proximity to monitoring site CB);
- There is negligible evidence of a notable change in surface water quality which may be related to mining influences in Matthews Creek, Cedar Creek or Stonequarry Creek;
- Following significant rainfall from 29 January 2021, the water level recorded at all sites was maintained at or above the baseline minimum for the remainder of the review period (to 3 March 2021) with the surface water behaviour consistent with baseline conditions.
- Despite evidence of mining related effects on the water level characteristics of pools in Cedar Creek, there has been no visible evidence of cracking, splitting or spalling of the creek rock bar controls and levels of iron oxy-hydroxide precipitation have not exceeded levels observed during the baseline (pre-mining) period.
- Less than 10% of the pools within the Investigative Area have been impacted and no impacts to pool SR17 on Stonequarry Creek are evident. Consequently, there is negligible evidence to date of subsidence impacts with environmental consequences greater than minor associated with mining LW W1 and LW W2 (as defined in the LW W1-W2 Extraction Plan approval conditions).
- Based on the investigation findings, there is no evidence to suggest that connective cracking between the surface and LW W1 has occurred. Tahmoor Coal notes that a post-mining Height of Fracture borehole (HOF) will be completed in the middle of LW W2 panel to confirm.

In response to the TARP triggers and investigation report, a number of additional monitoring items have been for incorporation into the LW W1-W2 Water Management Plan and, consequently, the LW W3-W4 Water management Plan. These inclusions include:

- Inclusion of monitoring sites CC, CD, CE and CF on Cedar Creek in water quality monitoring program as an indicator of potential re-emergence of underflow reporting downstream of monitoring site CB;
- Installation of additional survey lines at monitoring sites CA, CB, CD, MR45 and MR46 (Matthews Creek);
- Inclusion of pools CB10 - CR24 and MR46 in fortnightly visual observations (fortnightly monitoring to be conducted during LW W1-W2 extraction only, reverting back to monthly for LW W3-W4 extraction);
- Increased monitoring frequency from monthly to fortnightly of water level data download at sites CC1A, CA and CB (fortnightly monitoring to be conducted during LW W1-W2 extraction only, reverting back to monthly for LW W3-W4 extraction); and
- Inclusion of manual water level monitoring at MR45 and MR46 on a fortnightly basis (fortnightly monitoring to be conducted during LW W1-W2 extraction only, reverting back to monthly for LW W3-W4 extraction).

Tahmoor Coal recently investigated the feasibility of installing temporary creek flow monitoring devices into the creeks (including low flow weirs and pre-calibrated flumes). Two sites were identified as having high suitability for implementation - an upstream site on Matthews Creek and an upstream site on Stonequarry Creek. However, the potential benefits that may be gained through accurate streamflow monitoring were concluded to be unjustifiable due to the following factors:

- Lack of highly suitable sites in upstream Cedar Creek or downstream Stonequarry Creek; and
- Only a limited period of data would be able to be acquired due to timing restrictions of approvals and the anticipated start of LW W3 mining.

Therefore, Tahmoor Coal would not be progressing with any streamflow works in the Western Domain. Tahmoor Coal is also investigating the potential installation of continuous water level monitoring equipment at MR45, which will be decided following the review of the next 4 months of monitoring data (ending August 2021).

### Observed and Predicted Subsidence in Stonequarry Creek

Stonequarry Creek is located to the north of LW W3-W4, adjacent to the commencing end of LW W3. The majority of Stonequarry Creek within the Study Area consists of a long Pool SR17, which is retained by Rockbar SR17 (refer to **Figure 3-4**). The pool is approximately 670 metres long, extending upstream to Rockbar SR16. Baseline monitoring has confirmed that the pool permanently holds water. Surface water levels and flows are monitoring upstream and downstream of Rockbar SR17 (MSEC, 2021).

The proposed extraction of LW W3-W4 is predicted to result in minor additional increases in subsidence, valley closure and upsidence along Stonequarry Creek. The predicted movements are in addition to movements that will have occurred previously due to the extraction of LW W1 (completed) and LW W2 (currently extracting), noting that LW W3 is setback further from Stonequarry Creek than LW W1-W2 from the streams (MSEC, 2021).

The observed valley closure has been less than prediction along Stonequarry Creek. Maximum closure has occurred around the confluence of Cedar and Stonequarry Creeks. Higher valley closure have been previously at creek junctions. Beyond the creek junction, observed valley closure has been less than 10 mm and ground extension has been observed at monitoring site SQ107, SQ108 and SQ109.

The valley closure prediction model is designed to be conservative and this has been confirmed by experiences observed across Stonequarry Creek during the mining of LW W1-W2. MSEC's valley closure prediction model does not distinguish between closure measured beyond the commencing end / finishing ends. As discussed by SCT (2021), the observations of reduced closure is consistent with expectations beyond the commencing ends of longwall panels.

Using actual data from LW W1-W2 across Stonequarry Creek it can be seen that sections of the creek have experienced ground extension of approximately 10 mm to 15 mm rather than valley closure, which indicates that these sections have experienced minor conventional tensile strains.

Based on the observations during the mining of LW W1-W2 across Stonequarry Creek, it is expected that Rockbar SR17 will experience between 10 mm of opening and closure, given that it is located a further 50 metres from LW W3 than this site.

### Observed and Predicted Rockbar Impacts in all Waterways

The potential for Type 3 impacts along Matthews, Cedar and Stonequarry Creeks has been assessed using the rockbar impact model for the Southern Coalfield, which relates the likelihood of impact on rockbars with the predicted total valley closure along the stream based on previous longwall mining experience in the Southern Coalfield. A Type 3 impact is defined as fracturing in a rockbar or upstream pool resulting in reduction in standing water level based on current rainfall and surface water flow (MSEC, 2021).

The maximum predicted total closure for Matthews and Cedar Creeks due to the total extraction of the Longwalls W1-W4 is 200 mm. The predicted rate of impact for the pools along these creeks due to the extraction of the proposed longwalls, therefore, is less than 10 %. As advised in Report No. MSEC1019 as part of the Extraction Plan application for LW W1-W2, impacts are more likely to occur near the commencing ends of LW W1-W3, where Cedar Creek is located closest to these longwalls, and where Cedar and Matthews Creeks are located closest to the tailgate of LW W1. The impacts that have been observed in Cedar Creek during the mining of LW W2 are located where valley closure was predicted to be 200 mm, adjacent to the tailgate of LW W1. The impacts observed to date are, therefore, within expectations (MSEC, 2021).

The likelihoods of fracturing and surface flow diversions reduce with distance away from the proposed longwalls. It is possible, therefore, that mining-induced fractures could occur at Rockbar SR17 due to the extraction of LW W3, however, it was concluded that fractures are extremely unlikely at low levels of closure or ground extension in the order of 10 mm. As closures increase from 10 mm to 20 mm, mining-induced fractures have only been evident infrequently along the creek bed and the nature of the fractures are similar to the naturally occurring fractures that are present at the site and negligible in the context of the heritage performance measures in DA 67/98 (SCT, 2021b).

The rockbar is thinly bedded in places and natural fractures are already present at isolated locations. If mining-induced fractures occur, it is possible that fracturing could create surface flow diversions within the rockbar if they can connect hydraulically in order for surface water to divert underground and emerge further downstream of Rockbar SR17 (MSEC, 2021).

The commencing position of LW W3 was setback 50 metres further from Stonequarry Creek compared to LW W2 to reduce the potential for adverse impacts on Rockbar SR17. The maximum predicted total closure for Stonequarry Creek due to the total extraction of the Longwalls W1-W4 is 80 mm and the predicted total closure at Rockbar SR17 is 60 mm. The predicted rate of impact for Rockbar SR17 due to the extraction of the proposed longwalls, therefore, is assessed to be less than 5 % (MSEC, 2021). Further discussion regarding potential impact to Rockbar SR17, including revised predictions and expected impacts, is provided in the SCRMP.

Investigations and assessments have also been conducted by SCT (2021) (**Appendix F**), who advise that valley closure movements are not expected to be large enough exceed performance requirements at the rockbar. Some opening of existing joints and the small fractures may form as minor readjustments occur in the ground around the rockbar in response to the proposed mining (MSEC, 2021).

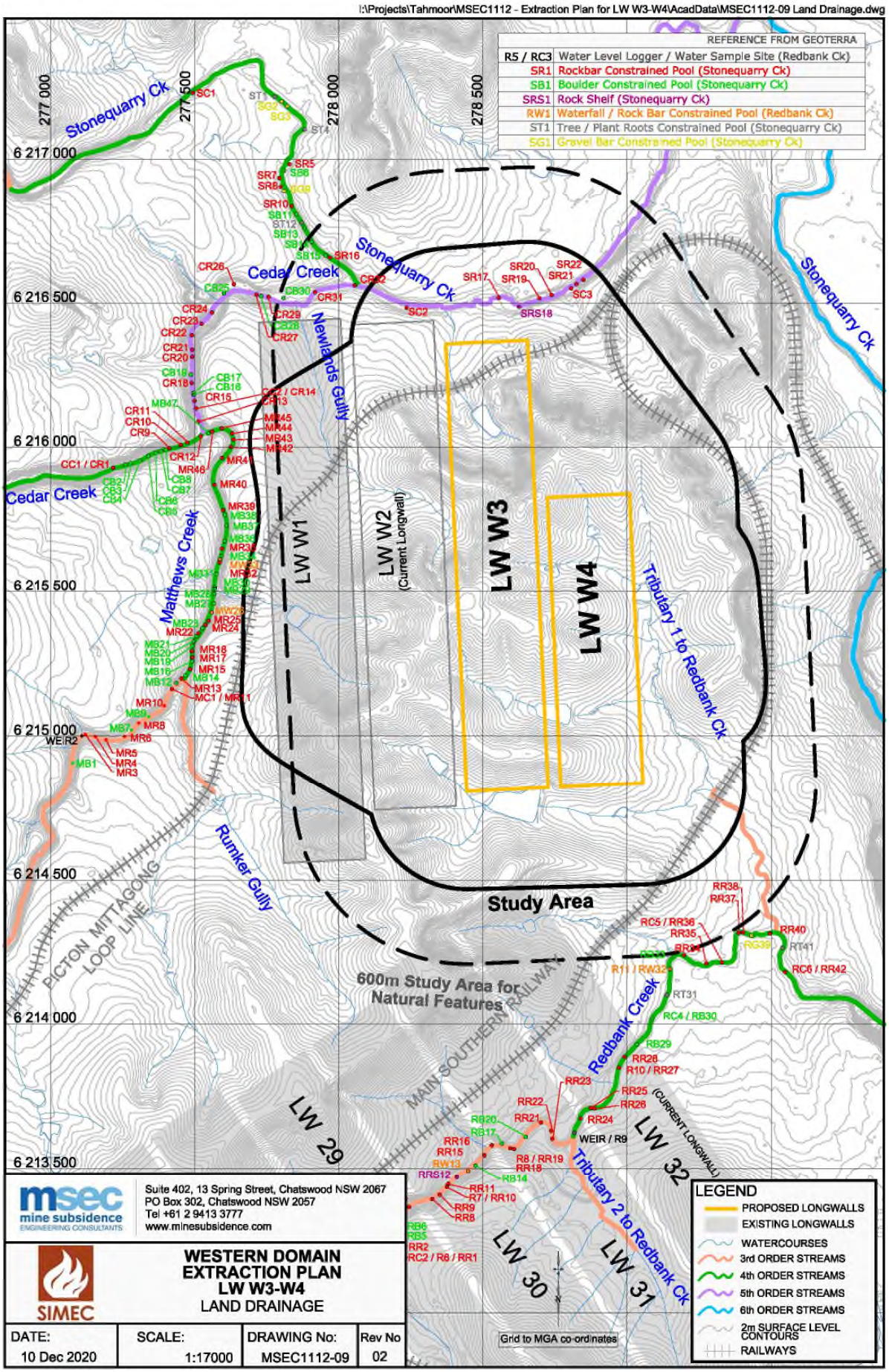



**Figure 3-4 Waterways within the LW W3-W4 Study Area and Rockbar SR17 (MSEC, 2021).**

### Current Rockbar Remediation Success and Future Application

In the event that impacts occur to Rockbar SR17 or any other rockbars, surface flow diversions can be remediated (MSEC, 2021).

Tahmoor Coal has commenced remediation of pools in Myrtle Creek and Redbank Creek with successful results, in consultation with the Tahmoor community, neighbouring landowners, Wollondilly Shire Council, the NSW DPIE, including the NSW Resources Regulator, and the NSW Department of Primary Industries - Fisheries.

A series of trials in 2019 and 2020 were conducted, building on the results of successful stream remediation projects at other longwall mining sites in the local area.

The remediation trial at Pool 23 rockbar on Myrtle Creek comprised injection of polyurethane into the fracture network in order to restore the pool holding capacity. Aesthetic values have improved following remediation and the water level has remained elevated for a period in excess of 11 months. Further details of remediation progress at Myrtle Creek is documented by SCT in the Myrtle Creek Rehabilitation Report (refer to Appendix E of the Extraction Plan Main Document).

Similar trials are currently being undertaken for pools in Redbank Creek with remediation progress continuously assessed.

In the case of Rockbar SR17, it is noted that no further mining will be conducted near the rockbar after the extraction of LW W3. LW W4 is set back substantially from Stonequarry Creek to reduce the potential for impacts on the Picton Railway Tunnel. In the unlikely event of impacts, remediation could commence based on observations soon after the influence of LW W3. Rockbar SR17 can also be accessed by vehicle (MSEC, 2021).

## 3.4.7 Observed and Predicted Impacts to Groundwater

During the extraction of LW W1, groundwater level in piezometers P12 (intake P12C), P13 (intake P13C) and P16 (intake P16B and P16C) was recorded to decline more than two metres below the baseline minimum for a period of more than six months. In addition, groundwater level at groundwater monitoring site TNC36 (intakes at 65, 97 and 169 metres below ground level) also declined more than five metres below the baseline minimum for a period of more than six months. These occurrences triggered two Level 4 TARP triggers for groundwater level, in accordance with the LW W1-W2 Water Management Plan.

A subsidence event notification for groundwater level reduction that triggered the Level 4 TARP triggers was provided to DPIE, Resources Regulator and NRAR on 30 December 2020.

An investigation into groundwater depressurisation has been completed, and a Surface Water and Groundwater Investigation Report was submitted to DPIE, Resources Regulator and NRAR on 9 April 2021. The key findings from the investigations regarding groundwater depressurisation were:

- The decline in groundwater level recorded at groundwater monitoring sites within the Investigative Area is likely attributed to mining induced regional depressurisation of deeper aquifers;
- The groundwater model predictions underestimated the groundwater level decline recorded at deeper groundwater monitoring bores (piezometers P12C, P13C, P16B and P16C);
- The rate of groundwater level decline has reduced and levels have been relatively stable since late 2020 (as indicated by groundwater levels); and

- Groundwater levels at P12 appear to have stabilised since mid-February 2021, however, may be subject to further groundwater depressurisation as LW W2 progresses due to the proximity of P12 to LW W2.

In response to the TARP triggers and investigation report, a number of additional monitoring items have been or will be considered for incorporation into the LW W1-W2 Water Management Plan and, consequently, the LW W3-W4 Water management Plan. These inclusions include:

- Installation of a new piezometer ('P15') located between Stonequarry Creek and the commencing end of Longwall West 3.
- Installation of piezometer adjacent to Cedar Creek monitoring site CB in progress, scheduled for completion by 1 August 2021 subject to timely approval of the Groundwater Licence from NRAR.
- The need for an additional piezometer immediately to the east of monitoring site CD will be reviewed by Tahmoor Coal following a review of the next 4 months of monitoring data (ending August 2021).

In addition, Tahmoor Coal have refined the Groundwater Level TARP significance levels so that triggers occur for meaningful effects or effects that are more significant with respect to drawdown at groundwater monitoring bores and surface water systems. The refined Groundwater Level TARPs are incorporated into the LW W3-W4 Water Management Plan which forms part of this Extraction Plan.

### 3.4.8 Observed and Predicted Impacts relating to the Nepean Fault Complex

The Nepean Fault is located east of the mining area. Tahmoor Coal commissioned an engineering geologist from Strata Control Technology in 2018 to undertake site inspections and mapping of the Nepean Fault, which focused on the commencing end (south-eastern end) of LW 32. A second detailed inspection of the Nepean Fault Complex was commissioned in 2020, specifically around the Picton Tunnel on the Main Southern Railway (SCT, 2020; attached in **Appendix G**).

The revised mapping describes the Nepean Fault as comprising a series of en echelon faults, rather than one continuous geological structure. Non-conventional structures could occur anywhere within the Nepean Fault Complex. A map of the Nepean Fault Complex and proximity to built structures within and adjacent to the LW W3-W4 Study Area is provided in **Figure 3-4**.

The SCT (2020) investigation identified the following:

- At the north-eastern corner of the panel, LW W3 is located 250 m west of the nearest mapped fault trace and in the south-eastern corner of the panel, LW W3 is located 570 m west of the nearest mapped fault trace. LW W4, in the north-eastern corner of the panel, is located 20 m west of the nearest mapped surface trace and 245 m in the south-eastern corner of the panel.
- The Nepean Fault Complex is projected to pass through the Picton Tunnel. The Picton Tunnel area is located within a fault ramp area;
- The structures in this area mainly comprises the terminal ends of the north-south trending fault segments, with minimal offsets distributed among the fault planes that are present. This is supported by visual inspections by an engineering geologist, observations of the terrain around the Picton Tunnel and a review of geotechnical coring investigations that have recently been completed alongside the Tunnel in December 2020;

- Field observations found no indication of disturbance of the strata immediately surrounding the Tunnel. Fault displacements were not readily observed in the area of the Tunnel, which is consistent with an interpretation that the first order faults have transitioned into multiple fault segments that have dispersed the fault displacements; and
- The nature of the faulting within the Picton Tunnel area strongly indicates that the Nepean Fault Complex has formed in a tensile, "extensional", environment.

SLR (2021a) note that the significant high angle structural feature is known to be transmissive and, as such, mine workings that intersect this zone may produce more water and increased groundwater depressurisation in overlying strata may occur. The permeability within the Nepean Fault zone in the vicinity of LW W4 would govern the longitudinal movement of groundwater along the fault zone, however, the permeability along the Nepean Fault zone is uncertain (HEC, 2021).

The Subsidence Predictions and Impact Assessment Report (Appendix A; MSEC, 2021) completed a study to ascertain whether irregular subsidence occurred during the extraction of previous longwalls in proximity to the Nepean Fault. This was determined by reviewing subsidence observations from data collected along survey lines which crossed structures associated with the Nepean Fault. Further details of this study are provided in Section 3.8 of Appendix A.

The study found no increased subsidence, tilt or strains were measured along the survey lines that were located over unmined, solid coal areas between the extracted longwalls and the Nepean Fault. The experiences observed to date have shown no significant differential movements across the Nepean Fault complex (MSEC, 2021).

During the mining of LW W1, observed subsidence has been substantially less than predicted, and LW W2 observed subsidence is also likely to be less than predicted. It is possible, however, that increased subsidence could develop above LW W3 and LW W4 as these longwalls are closer to the Nepean Fault. However, while the possibility for significant differential movement across the Nepean Fault complex to the side of proposed LW W3-W4 cannot be ruled out, the likelihood is considered to be very low based on the experiences observed to date (MSEC, 2021).

This is supported by the assessment provided by SCT (2020; Appendix F). This report found that the presence of the Nepean Fault Complex could cause an increase in subsidence above longwalls W3 and W4, especially so for W4 given its proximity. SCT also concluded that "in the unlikely event that greater than predicted subsidence occurs over Longwalls W3 and W4, there is no expectation of significantly greater than predicted subsidence outside the panel footprint" and that mobilisation of fault structures due to longwall subsidence is not likely.

Monitoring will therefore be conducted during the early stages of extraction of LW W3-W4 to compare observations with predictions. Tahmoor Coal has extensive experience in successfully managing potential subsidence impacts on surface features, even when actual subsidence is substantially greater than the magnitudes that have been predicted above single panel LW W3-W4 (MSEC, 2021).

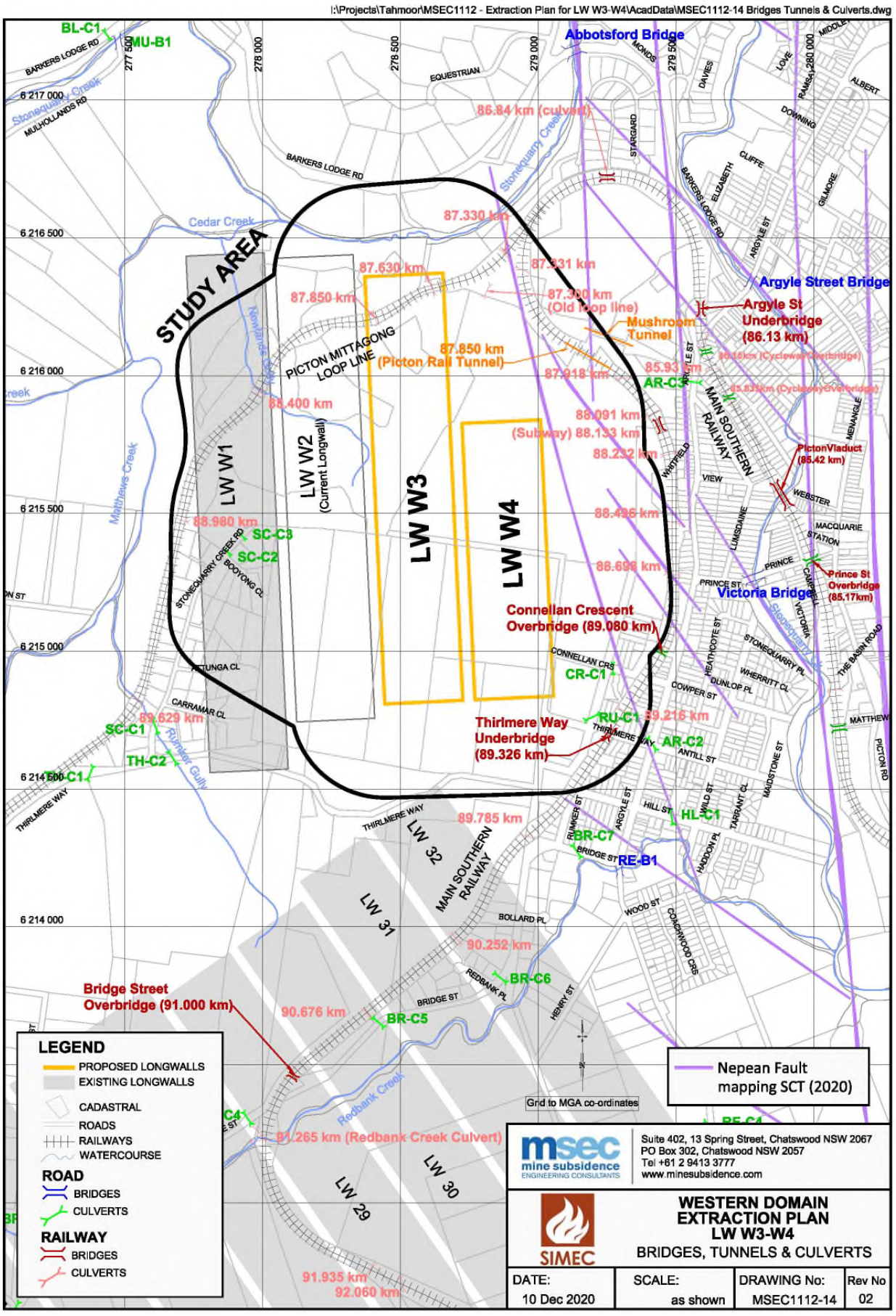



**Figure 3-5 Nepean Fault Structures and nearby Built Features (MSEC, 2021)**

The monitoring of the Picton Tunnel will be completed in accordance with the LW W3-W4 Main Southern Railway Management Plan (to be prepared). While non-conventional movements as a result of LW W3-W4 extraction may potentially result in changes to track geometry that exceed the National Code of Practice, the potential risk to track safety can be managed through early detection via monitoring and early response through the implementation of triggered response plans. With an appropriate management plan in place, it is considered that potential impacts on track geometry can be managed during the mining of the proposed longwalls, even if actual subsidence movements are greater than the predictions or substantial non-conventional movements occur (MSEC, 2021).

Tahmoor Coal is currently completing geotechnical investigations to gather further information regarding the Nepean Fault Complex in proximity to LW W3-W4. A report providing a review of the findings from this investigation will be provided to DPIE once available.

## 3.5 Performance Measures and Indicators

### 3.5.1 Performance Measures

Performance objectives in relation to the subsidence impacts are outlined in DA 67/98. Performance measures relating to natural and heritage features are provided in Table 1 of DA 67/98 Condition 13A, and are presented in **Table 3-12**. Performance measures relating to built features are provided in Table 2 of DA 67/98 Condition 13E, and are also presented in **Table 3-12.** These objectives have been used when developing the management strategies incorporated in this Extraction Plan.

**Table 3-12 Subsidence Impact Performance Measures from DA 67/98**

| Feature | Performance Measures |
|---|---|
| **Biodiversity** | |
| • Threatened species, threatened populations, or endangered ecological communities | • Negligible environmental consequences. |
| **Heritage Sites** | |
| • Heritage sites | • Negligible subsidence impacts or environmental consequences.<br>• Negligible loss of heritage value. |
| • Other Aboriginal and heritage sites | • Negligible subsidence impacts or environmental consequences. |
| **Mine workings** | |
| • First workings | • To remain long term stable and non-subsiding. |
| • Second workings | • To be carried out only within the approved mine plan, in accordance with an approved Extraction Plan. |
| **Key Public Infrastructure** | |
| • MSR;<br>• Picton Tunnel;<br>• PMLL; and<br>• Electricity transmission lines and towers. | • Always safe and serviceable.<br>• Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired. |
| **Other Infrastructure** | |
| • Electricity distribution lines, poles and associated towers;<br>• Unsealed roads and road culverts, fire trails, fences and other built features; and<br>• Other public infrastructure. | • Always safe.<br>• Serviceability should be maintained wherever practicable.<br>• Loss of serviceability must be fully compensated.<br>• Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated. |
| • Privately-owned residences | |
| • Other privately-owned built features and improvements, including farm dams, swimming pools, tennis courts, roads, tracks and fences | |
| **Public Safety** | |
| • Public Safety | • Negligible additional risk. |

With regards to the subsidence performance measure discussed in **Table 3-12**, 'negligible' is defined as being 'so small and insignificant as to not be worth considering'. Further discussion on the definition of 'negligible' in light of the Aboriginal heritage item located on the Stonequarry Creek Rockbar is provided in the Stonequarry Creek Rockbar Management Plan.

### 3.5.2 Performance Indicators

To establish compliance with the performance measures outlined in **Table 3-13** and **Table 3-14**, Tahmoor Coal has developed subsidence and environmental monitoring programs in consultation with stakeholders as detailed in **Section 5** of this Extraction Plan, and within the key component plans.

Trigger Action Response Plans (TARP) have been developed as part of the monitoring of performance indicators for the relevant management plans to establish an appropriate response if a performance indicator is triggered. These TARPs provide a clear defined trigger with an appropriate action and response for each risk level.

It should be noted that an additional risk level has been included in the Water Management Plan TARPs compared to other TARPs in response to consultation during the LW W1-W2 Extraction Plan. This is outlined in **Table 3-13** and **Table 3-14**. A different format has been adopted for the Stonequarry Creek Rockbar Management Plan, which is illustrated in **Appendix D**.

The TARPs are discussed further in **Section 3.6.2** and a Master TARP consolidating all the aspects is provided in **Appendix D**.

**Table 3-13 Performance Indicators and TARP Risk Management Scenarios for Land, Biodiversity and Heritage Management Plan TARPs**

| Risk Level | Trigger Description | Action / Response |
|---|---|---|
| Level 1 | Normal - Operations within prediction impacts. | Continued operations and monitoring as normal. |
| Level 2 | Within Prediction - Operations within predicted impacts but exceeds or potentially exceeds predictions. | Review and investigation processes are engaged, with management / corrective actions as required. |
| Level 3 | Exceeds Prediction - Operations exceed predicted impact. | Review and investigation processes are engaged, and management /corrective actions fully engaged. |

**Table 3-14 Performance Indicators and TARP Risk Management Scenarios for Water Management Plan TARPs**

| Risk Level | Trigger Description | Action / Response |
|---|---|---|
| Level 1 | Normal – Operations within predicted impacts. | Continued operations and monitoring as normal. |
| Level 2 | Within Prediction - Operations within predicted impacts but exceeds or potentially exceeds predictions. | Review and investigation processes are engaged, with management / corrective actions as required. |
| Level 3 | Almost Exceeds Prediction - Operations within predicted impacts but are likely to almost exceed predictions. | Review and investigation processes are engaged, with management / corrective actions as required. |
| Level 4 | Exceeds Prediction - Operations exceed predicted impact. | Review and investigation processes are engaged, and management /corrective actions fully engaged. |

## 3.6 Subsidence Management Strategies

Subsidence management at Tahmoor Mine follows the risk hierarchy approach of risk elimination (impact avoidance), substitution and mitigation, engineering controls, management and monitoring.

Subsidence management and mitigation strategies for each relevant environmental and built feature are described within the relevant management plans developed in support of the Extraction Plan outlined in **Section 4**. Further to detailed discussion in mine design (refer

**Section 2.2**), the following sections provide addition discussion on impact avoidance measures, adaptive management processes, and contingency management using TARPs.

### 3.6.1 Avoidance

Impact avoidance (risk elimination) is the highest level of risk management control under the risk hierarchy and is the starting point for mine design wherever practicable.

There are two management strategies for avoiding or minimising the impacts to sensitive surface features as a result of mining. These are:

- Avoid mining under sensitive surface features; and/or
- Mine design under the sensitive surface features with a sub-critical void width.

As discussed in **Section 2.2**, the mine plan for LW W3-W4 has been modified since the 2014 SMP Application to avoid mining directly under streams of third order or above (Matthews Creek, Cedar Creek and Stonequarry Creek). This modification was achieved by re-orientation the longwalls in the Western Domain from a north-west to south-east orientation to a north to south orientation.

In addition, the longwalls in the Western Domain will be progressively extracted from west to east as opposed to the previously proposed sequence of east to west. From a mine subsidence perspective, the change in direction will reduce the impact of transient subsidence effects on houses within the Stonequarry Estate. In addition, this change in sequence will allow Tahmoor Coal to track mining-induced movements as the mine extends towards the Picton Railway Tunnel on the MSR, which is a substantial and significant item of civil infrastructure.

No changes were made to pillar width as part of the latest mine plan revision.

### 3.6.2 Trigger Action Response Plans

Tahmoor Coal has developed TARPs for each relevant component management plan prepared to support the LW W3-W4 Extraction Plan (refer to key component plans discussed in **Section 4** of this Extraction Plan). A Master TARP consolidating all aspects from the management plans is provided in **Appendix D**.

The TARPs have been developed using the performance indicators for subsidence impacts relevant to each component management plan. The TARPs outline the assigned level of risk for each performance indicator, as described in **Table 3-13** and **Table 3-14**. Level 1 of the TARP indicates that, based on monitoring results, the environment is performing within normal levels. Where performance indicators indicate that a level of risk has been triggered greater than a normal level (Levels 2 or higher with escalating corresponding risk), a response in the form of management / corrective actions is required to be implemented as outlined in the TARP.

### 3.6.3 Contingency Plans

In the event that performance measures are considered to have been exceeded or are likely to be exceeded as a consequence of mining activities, a response will be undertaken in accordance with the TARPs outlined in **Appendix D**. This response is a contingency plan that describes the management / corrective actions which can be implemented where required to remedy the exceedance.

The contingency plan in the event of an exceedance of performance indicators may include:

- Management actions;

- Corrective actions;
- Preventative actions;
- Further investigations; and
- Implementation of a Corrective Action Management Plan (CAMP).

If a CAMP is required in accordance with the TARP, this document will be prepared in consultation with key Government agencies. The CAMP will include the following key elements:

- Investigation of the impact and root cause analysis;
- Review of monitoring data and extent of environmental consequences;
- Technical review into remediation methodology options;
- Establishment of remediation success criteria;
- Development of remediation strategy;
- Development of post-remediation review; and
- Project management administration, controls, scheduling and reporting.

The success of remediation measures that has been implemented for any TARP exceedance would be reviewed as part of any CAMP and the Annual Review (refer to **Section 6.1.5**).

### 3.6.4 Adaptive Management Strategy – Review of LW W3 Start Position

#### Overview

As discussed in **Section 2.2.1**, the primary reason for the revision of mine design following consultation for the 2014 SMP Application was to reduce subsidence impacts to Matthews, Cedar and Stonequarry Creeks. The revised subsidence predictions (MSEC, 2021) for the current mine plan have estimated a maximum predicted total closure of 200 mm for the creeks (excluding Rockbar SR17) and a 10 % predicted rate of impact for the pools along the creeks as a result of LW W1-W2 extraction.

An Adaptive Management Strategy is proposed to review mining-induced ground movements, subsidence impacts and environmental consequences to streams during the extraction of LW W2.

As described in the Water Management Plan, Tahmoor Coal implemented a detailed monitoring program to measure and record mining induced ground movements and impacts on Matthews, Cedar and Stonequarry Creeks during the mining of LW W1-W2. A review of relevant observations was undertaken after the LW W2 face had mined a sufficient distance such that the majority of mining-induced movements had occurred at the commencing end of LW W2 (after approximately 1,000 m of extraction).

According to the Adaptive Management Strategy, if impacts to streams were greater than anticipated, Tahmoor Coal would review (based on more detailed investigation as described in the sections below) amending the commencing position of LW W3 to further reduce the potential for impacts on streams within the 600 m Study Area for Natural Features, in particular pool SR17 on Stonequarry Creek.

#### Adaptive Management Process

The adaptive management strategy sets quantifiable assessment criteria and provides parameters for when additional setbacks from relevant watercourses should be implemented.

The following sections detail the process for assessing and determining if additional setback is required from Stonequarry Creek, which is also illustrated in **Figure 3-6.**

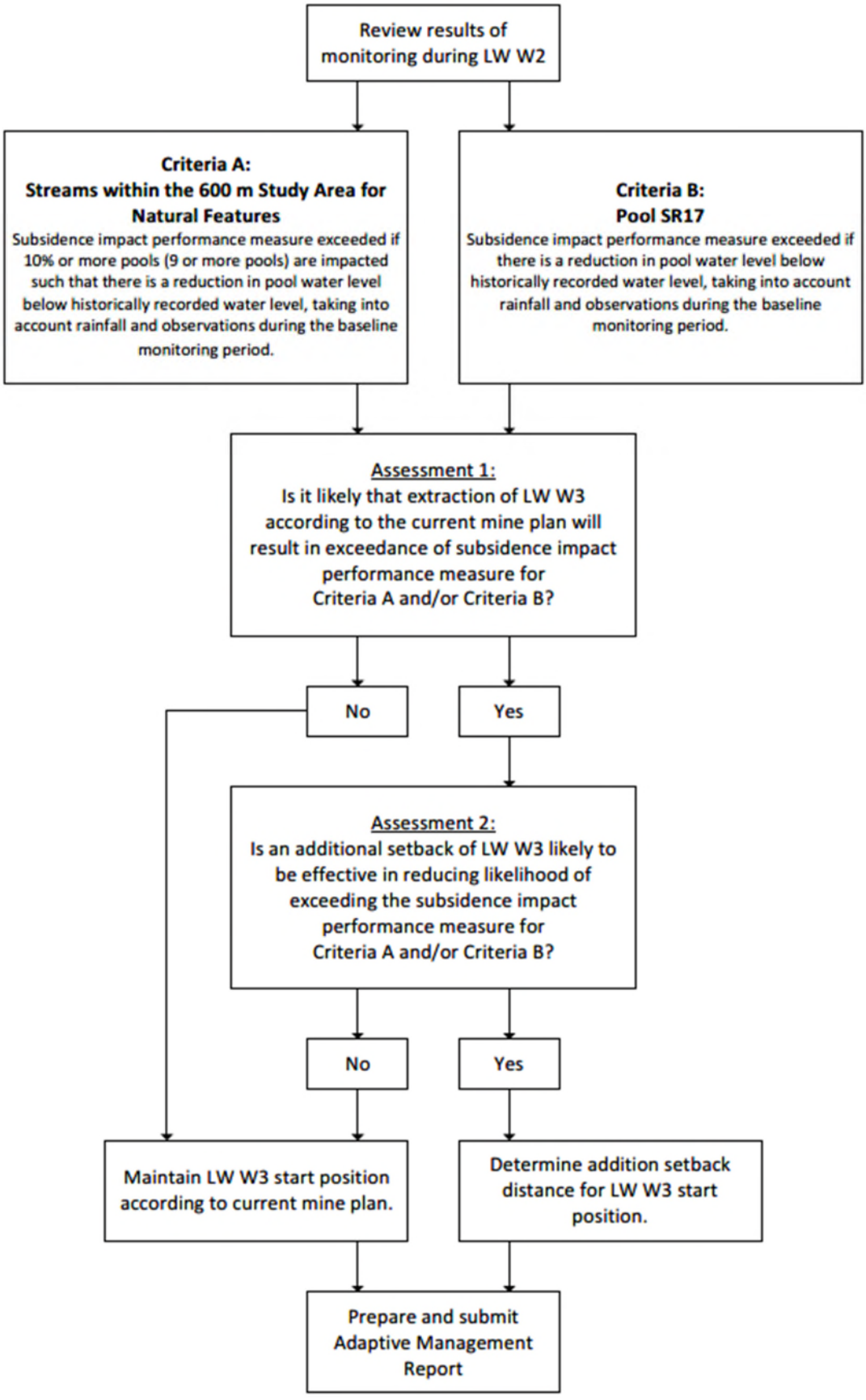



**Figure 3-6 Adaptive Management Strategy decision flowchart**

### Review and assess results of monitoring during LW W2

A review of monitoring results during the extraction of LW W2 was undertaken as part of the Adaptive Management Strategy. The review was incremental, in the sense that new information was collected and reviewed on a regular basis (e.g. monthly) as mining occurred.

Once the length of extraction of LW W2 exceeded approximately 1,000 m, it was expected that vertical subsidence would have approached maximum levels above LW W2 and rates of change in ground movements in the valleys located around the commencing end of LW W2 would have reduced to low levels. Whilst mine subsidence movements would continue to develop as mining progressed, it was expected that sufficient information would be available to conduct a review as part of the Adaptive Management Strategy.

Given the complex nature of the monitoring data, no single monitoring parameter was used to definitively guide the outcome of the Adaptive Management Strategy. However, key considerations as a minimum reviewed included:

- Valley and rockbar closure - among the many mine subsidence parameters that are measured and calculated during mining, valley and rockbar closure is a key indicator that is used to assess impacts on streams. The following quantifiable assessments were conducted in relation to valley closure:
  - Comparison of predicted and observed closure (valley and/or rockbar closure, depending on availability of information), taking into account the effects of survey tolerance;
  - Distribution of valley and/or rockbar closure relative to LW W2, with particular focus to the section of Stonequarry Creek between the confluence with Cedar Creek and Rockbar SR17; and
  - Relationship between observed valley and/or rockbar closure and observed impacts.
- Water level – a comparison of baseline and during mining water levels in relevant pools was completed. This comparison considered recorded pre-mining (LW W1) recession rates and visual observations of pool cracking; and
- Cracking or any other subsidence impact or movement – observations of any of these subsidence impacts observed at pool SR17 and the associated rockbar.

The relevant results were assessed and a determination made regarding whether the current start position of LW W3 was likely to result in an exceedance of subsidence impact performance measures for streams within the 600 m Study Area for Natural Features and/or pool SR17.

### Determination of setback (if required)

If it was determined that the current position of LW W3 was likely to result in an exceedance of the subsidence impact performance measure for stream and/or pool SR17, detailed analysis would be undertaken to determine if setback of LW W3 is likely to result in an exceedance of the subsidence performance measures. If a setback is likely to reduce the likelihood of an exceedance occurring, an appropriate set back distance would be determined. This process would be completed by re-generating the subsidence model for LW W3 to include observed LW W2 subsidence measurements, and generating potential subsidence predictions for defined incremental setbacks from the streams and pool SR17.

**LW W2 Adaptive Management Report Outcomes**

Tahmoor Coal completed a review of observations of subsidence impacts and environmental consequences following the mining of the first 1,000 m of LW W2 in June 2021. This review was to determine whether additional setback for the commencing end of LW W3 was likely to further reduce the potential for subsidence impacts on Stonequarry Creek. The review found that there had been no exceedances of the subsidence impact performance measures, and a modification of the starting position of LW W3 was not proposed.

### 3.6.5 Adaptive Management Strategy - Groundwater

In order to support the adaptive management strategy outlined above for the mitigation and monitoring of subsidence related impacts to the streams, an adaptive management strategy has been developed for the groundwater monitoring network.

The current groundwater monitoring network includes several recently drilled open-standpipe bores that are positioned within the shallow aquifer adjacent to Stonequarry Creek, specifically bores P12, P13, P14 and P17. These bores are positioned progressively along Stonequarry Creek so as to collect data that would determine the downstream distance any potential subsidence related impacts in the watercourse. However, as part of the adaptive management strategy for groundwater it is necessary to have provisions that allow for additional groundwater monitoring bores be drilled should any of the existing bores cease to function, or it is determined that the data being collected is insufficient or not representative of the local conditions.

Identifying potential subsidence related impacts to local water resources and network sufficiency should be made by a suitably qualified person following the assessment of groundwater level data collected at as a result of mining of LW W1-W3. An assessment of pre- and post-mining permeability data collected from LW W2 will also be used in assessing whether the existing monitoring network is sufficient.

Should additional monitoring bores be required it would be necessary to convene with the Environmental Response Group (ERG) (refer to **Section 6.3.2** for further information) and suitably qualified professionals as to the best location to install these bores in consultation with the relevant landowners.

# 4 Key Component Plans

## 4.1 Overview of Environmental Management

### 4.1.1 Environmental Management Strategy Framework

Tahmoor Coal has developed an Environmental Management System Framework (EMSF) (TAH-HSEC-00173), which provides the strategic context for environmental management at Tahmoor Mine. The EMSF forms part of the broader Health, Safety, Environment and Community management systems at Tahmoor Mine and outlines how Tahmoor Coal manages environmental and community aspects, impacts and performance. The EMSF provides a framework for the standards, plans and procedures implemented to ensure operations are managed in accordance with best practice Environmental Standards.

Environmental impacts at Tahmoor Mine are managed through a combination of environmental procedures, forms and other documents to satisfy legislative and stakeholder requirements. **Figure 4-1** provides an overview of the EMSF and the documents which are part of the strategic framework for environmental management at Tahmoor Mine.

### 4.1.2 Overview of Key Component Plans of this Extraction Plan

The overall framework for subsidence monitoring and management of impacts of this Extraction Plan is provided in the Subsidence Monitoring Program (**Volume 4**). This document outlines the monitoring program for the measurement of actual subsidence, and the inspection program for environmental consequences of subsidence to compare against predicted impacts to determine if actions have been triggered.

The Extraction Plan is supported by a set of individual management plans intended to manage particular environmental or built features within the Extraction Plan Study Area. The individual management plans, which have been prepared to specifically address DA 67/98 Condition 13H(vii), include:

- Water Management Plan – to manage potential environmental consequences to surface water and groundwater as a result of secondary extraction;
- Land Management Plan – to manage potential environmental consequences to landscape features and agricultural enterprises as a result of secondary extraction;
- Biodiversity Management Plan – to manage potential environmental consequences to aquatic and terrestrial biodiversity as a result of secondary extraction;
- Heritage Management Plan – to manage potential environmental consequences to Aboriginal and historical heritage as a result of secondary extraction;
- Built Features Management Plan – to manage potential environmental consequences to built feature as a result of secondary extraction. A number of sub-plans are currently in preparation to manage potential environmental consequences to infrastructure and specific building structures as a result of secondary extraction; and
- Public Safety Management Plan – to ensure public safety in the Extraction Plan Study Area.

If a subsidence impact or environmental consequence occurs, the required action(s) are provided in the master Trigger Action Response Plan (TARP) in **Appendix D** or the individual management plan to which the trigger refers to.

**Figure 4-1** provides an overview of the environmental management plans and other environmental management documents that have been prepared to manage environmental impact resulting from LW W3-W4 extraction.

**Table 3-1** provides a summary of environment and built features within the Extraction Plan Study Area and in which key component plans they are managed. The location of these features is illustrated in **Appendix C** of the Subsidence Predictions and Impact Assessment Report (MSEC, 2021) (**Appendix A**)**.**

It should be noted that:

- All environmental and built features are discussed in the Subsidence Prediction and Impact Assessment Report (MSEC, 2021; **Appendix A**);
- All monitoring measures for these features are summarised in the Subsidence Monitoring Program (**Volume 4**); and
- The Built Features Management Plan is an umbrella document for the management of built infrastructure, and a number of sub-plans are currently in preparation to manage potential environmental consequences to infrastructure and specific building structures as a result of secondary extraction (**Volume 4**).

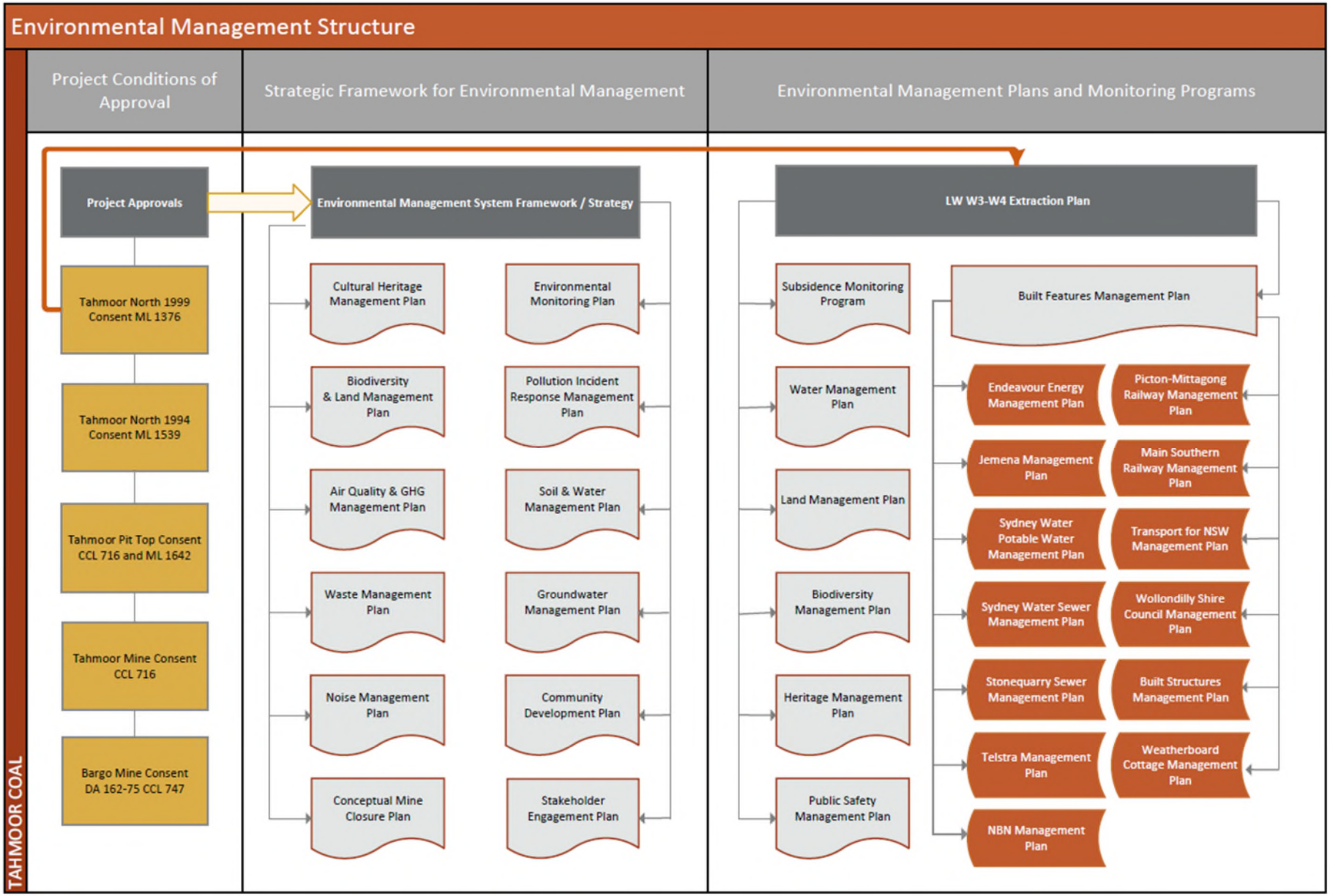



**Figure 4-1 Overview of Environmental Management Structure for Tahmoor Coal**

## 4.2 Risk Assessments

### 4.2.1 General Risk Assessment

Tahmoor Coal has completed a Risk Assessment for the extraction of LW W3-W4 on 23 September 2020 to determine the major risks relating to built infrastructure and environmental features associated with secondary extraction of LW W3-W4. In addition, the assessment also identified other risks that may impact on achieving timely approval for the commencement of LW W3-W4 extraction, as well as the completion of extraction of LW W3-W4.

The Risk Assessment considered the areas below:

- Obtaining LW W3-W4 Extraction Plan approval;
- Obtaining Aboriginal Heritage Impact Permit (AHIP) and/or WSC approval for proposed Weatherboard Cottage Management Plan;
- Impacts to utility infrastructure owned by Endeavour Energy (electrical), Sydney Water (potable water and sewer), Stonequarry Creek Estate Sewerage Plant (sewer), Jemena (gas), Telstra (telecommunications), NBN (telecommunications), Wollondilly Shire Council (roads, culverts and bridges), and Spatial services (survey marks);
- Impacts to rail infrastructure include the MSR and PMLL;
- Impacts to rural properties and structures such as built structures, pools, septic tanks, and farm dams;
- Impacts to land owners and the community;
- Impacts to watercourses including pool water level, streamflow, water quality, and flood potential;
- Impacts to groundwater including groundwater level and water quality;
- Impacts to landscape features such as steep slopes and agricultural land capability;
- Impacts to aquatic ecology including aquatic habitat, macroinvertebrates, fish, and threatened aquatic species and habitat;
- Impact to terrestrial ecology including riparian vegetation, threatened ecological communities, threatened amphibians, threatened microbats, and groundwater dependent ecosystems;
- Impacts to Aboriginal heritage items including grinding groove sites, scarred trees, and surface scattered; and
- Impacts to historical heritage items including buildings of local heritage significance (Weatherboard Cottage, Picton Heritage Rail including Picton Tunnel, Mushroom Tunnel) and sandstone and brick culverts associated with the PMLL.

The Risk Assessment was completed by members of the Tahmoor Coal Environment and Community Department and relevant technical specialists, and was facilitated by a Tahmoor Coal internal facilitator. A copy of the risk assessment report is appended to the PSMP (**Volume 4**).

The primary objectives of the Risk Assessment were to:

- Ensure the required approvals for the proposed longwalls are obtained in a timely manner to enable mining to commence;
- Ensure all environmental risks are appropriately eliminated or managed according to environmental legislation requirements;

- Ensure the safe and serviceable operation of all surface infrastructure and structures in the Study Area;
- Ensure that the health and safety of people who may be present in the Study Area are not put at risk due to mine subsidence;
- Assist in the establishment of procedures to measure, monitor, control, mitigate and repair infrastructure in the Study Area; and
- Ensure the required management plans for environmental features and built features are prepared and in place in a timely manner to manage potential impacts to environmental features or built features during mining.

### 4.2.2 Rail Risk Assessments

Additional risk assessments focusing on the MSR and PMLL railway infrastructure were held on 10 February 2021 and 24 February 2021, respectively. The purpose of the risk assessments was to evaluate the potential subsidence impacts associated LW W3-W4 extraction on MSR and PMLL rail infrastructure, and to ensure risks will be managed appropriately.

The Risk Assessment was completed by members of the Tahmoor Coal Environment and Community Department, key stakeholders and subject specialists, and was facilitated by an external facilitator. A copy of the risk assessment reports are appended to the PSMP (**Volume 4**).

The primary objectives of the Risk Assessments were to ensure the protection of the health and safety of all users of the MSR and PMLL corridor infrastructure.

### 4.2.3 Risk Assessment Methodology

The risk assessment process is completed to satisfy Tahmoor Coal's requirements in relation to WHS and in compliance to mining regulations and conditions and is completed in consultation with key stakeholders.

The risk assessments for LW W3-W4 were completed in accordance with:

- Risk Management (TAH-HSEC-00229) standard prepared by Tahmoor Coal, which details the 12 Step Risk Management Process for managing risk and the risk matrix used to categorise risks;
- WRAC Workplace Risk Assessment and Controls (TAH-HSEC-00014) standard prepared by Tahmoor Coal, which details the methodology for use during the risk assessment;
- AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines; and
- Risk Management Handbook for the Mining Industry (MDG1010).

Risks were identified and assessed through the review of known surface and sub-surface features within the Extraction Plan Study Area. Risk assessment also drew upon the experience and results of previous risk assessments completed for previous longwalls at Tahmoor Mine.

Management of the identified risks followed the 12 Step Risk Management Process as detailed in the Risk Management (TAH-HSEC-00229) standard, and a risk ranking (low, medium, and high) was assigned to each risk according to risk classifications as detailed in the Tahmoor Coal Risk Management (TAH-HSEC-00229) standard.

### 4.2.4 Identification of Potential Risks

The Risk Assessment for LW W3-W4 (General Risk Assessment) identified a total of 67 potential risks/hazards, which included:

- One high level risk, 14 medium level risks and 52 low level risks;
- Six risks that were satisfactory and did not require any further risk control, and 61 risks that required further improvement;
- Risk consequences included:
  - 28 risks with property damage consequences;
  - 13 risks with environmental impact consequences;
  - Nine risks with health and safety consequences;
  - Nine risks with financial consequences;
  - Six risks with legal and compliance consequences;
  - One risk with community / reputation consequences; and
  - One risk with investment return consequences.

The one high level risk was associated with approval for LW W3-W4. An Adaptive Management Report was completed following 1,000 m extraction of LW W2 to review the starting position of LW W3. This was completed, and the commencing position was confirmed as discussed in **Section 3.6.4**. A Stonequarry Creek Rockbar Management Plan (SCRMP) was created with an associated TARP with trigger points to stop the longwall if certain triggers are met.

The Risk Assessment for the PMLL railway infrastructure identified a total of 16 potential risks, which included two medium level risks and 14 low level risks. The two medium level risks and one low level risk were rated as having a potential worst case credible consequence of a train derailment. However these risks were associated with a 'Rare' likelihood of occurrence and existing 'proven over time' risk controls have been demonstrated to be in place.

The Risk Assessment for the MSR railway infrastructure identified 25 low level risks for the assessed bridges, tunnels and Picton Viaduct. The low level risk ranking is a result of the inherent control, being the distance from LW W3 and LW W4 to the structures, along with the existing and planned controls. The Risk Assessment identified a brick failure in Picton Tunnel breaching a train's windscreen and striking the driver resulting in a fatality, however this risk was considered to be rare and 'may only occur in exceptional circumstances'.

A program for implementation of the proposed risk control measures and procedures was identified during each risk assessment, and detailed in the risk assessment reports appended to the PSMP (**Volume 4**).

## 4.3 Water Management Plan

A WMP for LW W3-W4 has been prepared to identify the monitoring and management measures for surface water and groundwater resources within the Extraction Plan Study Area that are required to be implemented to demonstrate that the relevant performance measures are achieved. The WMP focused on watercourses, farm dams, and groundwater. Stonequarry Creek is the only watercourses in the Study Area that is of 3$^{rd}$ or higher stream order.

The WMP was prepared to address the requirements listed in DA 67/98 Condition 13H(vii)(c) (refer to **Table 2-1** of the WMP), the DPIE *Draft Guidelines for the Preparation of Extraction Plans V5* (DPE, 2015), and regulatory requirements (refer to **Section 2.2** of the WMP). The WMP was prepared in consultation with the EPA, DPIE Water, Resources Regulator, WaterNSW, WSC, SES, Resources Regulator, NRAR and EES (refer to **Section 2.1.1**).

The WMP provides information on (but not limited to) the following:

- Baseline data for surface water (water level, streamflow and water quality), and groundwater levels (**Section 3** of the WMP);
- Predicted subsidence impacts and environmental consequences to surface water and groundwater resources (**Section 4** of the WMP);
- Performance measures and performance criteria for surface water and groundwater (**Section 5.1** of the WMP);
- Surface water monitoring measures relating to daily rainfall, pool water level, streamflow, stream water quality, private dams, channel and bank stability, stream and riparian vegetation health, and flooding (**Table 5-3** of the WMP);
- Groundwater monitoring measures relating to groundwater level and water quality (**Table 5-3** of the WMP);
- Water management measures for surface water and groundwater resources (excluding dams, which are discussed in the LMP) (**Section 6.2** of the WMP);
- Program to validate groundwater models for the development; and
- TARPs to be implemented to manage and protect surface water and groundwater resources (excluding dams, which are discussed in the LMP) (**Appendix A** of the WMP).

Watercourses within the LW W3-W4 Study Area are identified on **Figure 4-2**. A summary of water monitoring measures is provided in **Section 5.3**, and surface water and groundwater TARP actions are consolidated in **Appendix D**.

The following documents were prepared to support the WMP:

- Surface Water Technical Report (HEC, 2021) – provides details of baseline data, monitoring and management measures, and TARPs for surface water resources in the LW W3-W4 Study Area;
- Flood Impact Study (WRM, 2020) – provides a flood impact assessment for LW W1-W4 for the 1% Annual Exceedance Probability and the Probable Maximum Flood events;
- Groundwater Technical Report (SLR, 2021a) – provides details of baseline data, monitoring and management measures, and TARPs for groundwater resources in the LW W3-W4 Study Area;
- Baseline Private Bore Assessment (GeoTerra, 2021) – provides a description of existing private groundwater bores in the Study Area, bore yields and serviceability of accessible bores, groundwater quality from accessible bores, and an assessment of potential impacts to these bores as a result of LW W3-W4 extraction; and
- Geotechnical Assessment (Douglas Partners, 2021) – provides an overview of farm dams in the LW W3-W4 Study Area, as well as an assessment of likely impacts to these features and consequence impacts to built features as a result of LW W3-W4 extraction.

The WMP and supporting documents are provided in **Volume 2** of this Extraction Plan.

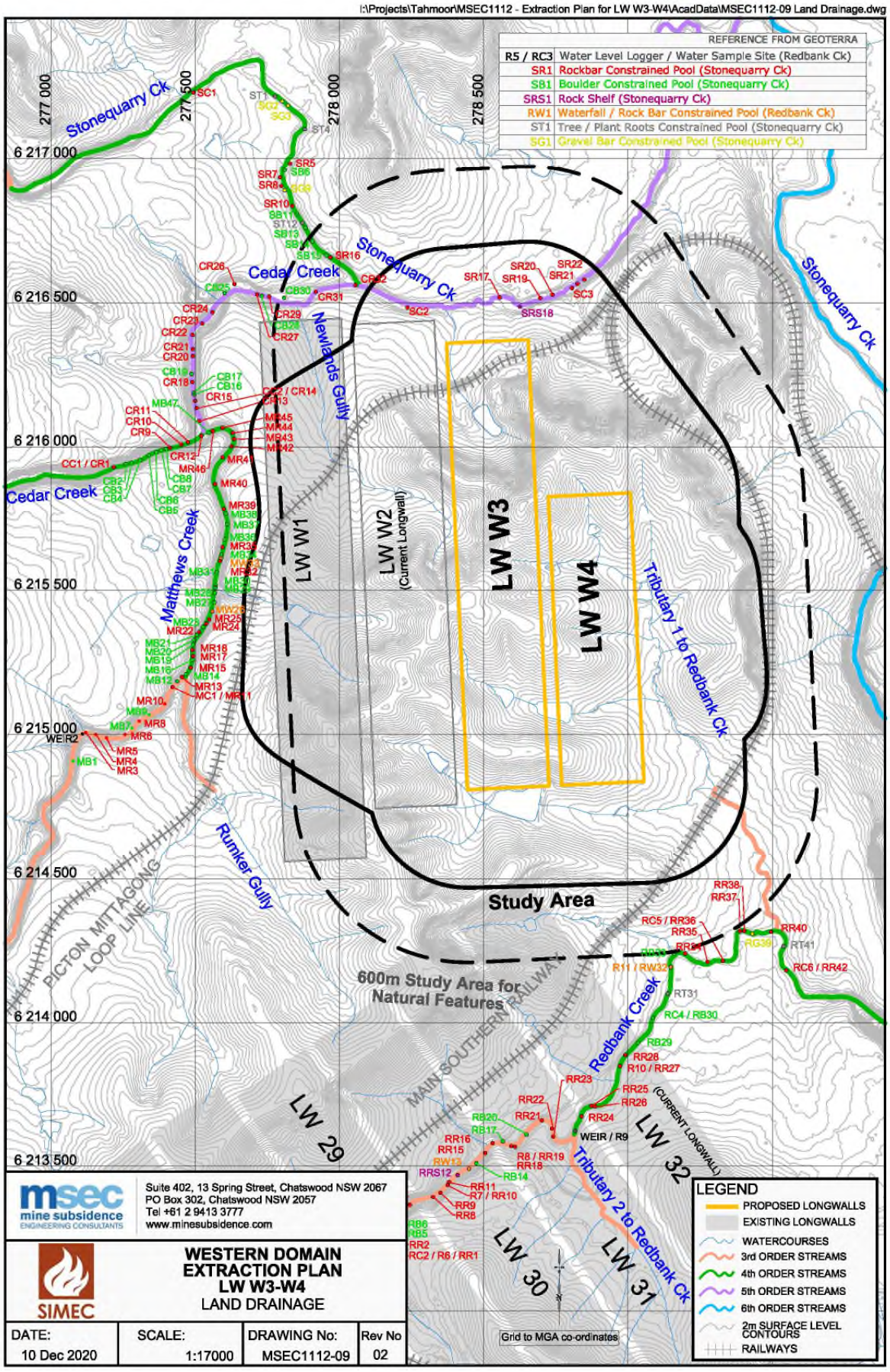



**Figure 4-2 Western Domain Extraction Plan LW W3-W4 – Land Drainage (MSEC, 2021)**

## 4.4 Land Management Plan

A LMP for LW W3-W4 has been prepared to identify the monitoring and management measures for landscape features and agricultural resources within the Extraction Plan Study Area that are required to be implemented to demonstrate that the relevant performance measures are achieved. The LMP focused on steep slopes and agricultural enterprises.

It should be noted that landscape features of floodplains, creeks and watercourses, and groundwater are discussed in the WMP.

The LMP was prepared to address the requirements listed in DA 67/98 Condition 13H(vii)I (refer to **Table 2-1** of the LMP), the DPIE *Draft Guidelines for the Preparation of Extraction Plans V5* (DPE, 2015), and other regulatory requirements (refer to **Section 2.2** of the LMP). The LMP was prepared in consultation with the DPI Agriculture and DPIE Crown Lands (refer to **Section 2.1.1**).

The LMP provides information on (but not limited to) the following:

- Baseline data for landscape features and agricultural enterprises (**Section 3** of the LMP);
- Predicted subsidence impacts and environmental consequences to landscape features and agricultural enterprises (**Section 4** of the LMP);
- Performance measures and performance criteria for landscape features (**Section 5.1** of the LMP);
- Monitoring measures for landscape features (**Table 5-3** of the LMP);
- Management measures for landscape features (**Section 6.2** of the LMP); and
- TARPs to be implemented to manage landscape features (**Appendix A** of the LMP).

Steep slopes within the LW W3-W4 Study Area are identified on **Figure 4-3**. A summary of landscape and agricultural monitoring measures is provided in **Section 5.3**, and landscape and agricultural TARP actions are consolidated in **Appendix D**.

The following documents were prepared to support the LMP:

- Geotechnical Assessment (Douglas Partners, 2021) – provides an overview of steep slopes in the LW W3-W4 Study Area, as well as an assessment of likely impacts to these features and consequence impacts to built features as a result of LW W3-W4 extraction; and
- Land and Agricultural Resource Assessment (SLR, 2021b) – provides an overview of the landscape, land and soil capability, and agricultural enterprises in the LW W3-W4 Study Area, as well as an assessment of likely impacts to these features as a result of LW W3-W4 extraction.

The LMP and supporting documents are provided in **Volume 2** of this Extraction Plan.

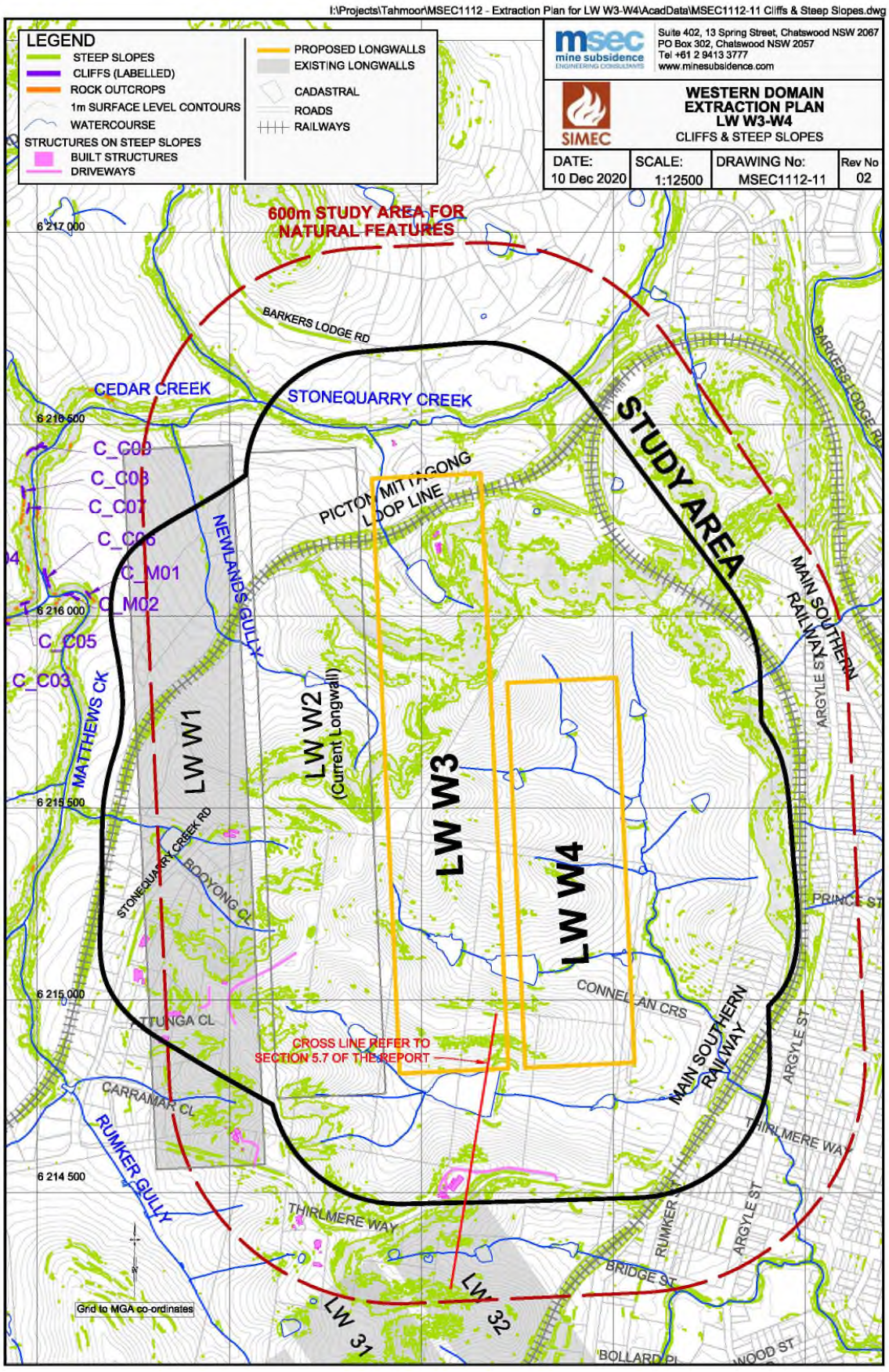



**Figure 4-3 Western Domain Extraction Plan LW W3-W4 – Cliffs and Steep Slopes (MSEC, 2021)**

## 4.5 Biodiversity Management Plan

A BMP for LW W3-W4 has been prepared to identify the monitoring and management measures for aquatic and terrestrial biodiversity within the Extraction Plan Study Area that are required to be implemented to demonstrate that the relevant performance measures are achieved. The BMP focused on aquatic and terrestrial biodiversity, with particular focus on threatened species, populations and their habitats, and Endangered Ecological Communities (EECs). It should be noted that there are no groundwater dependent ecosystems present in the Study Area.

The BMP was prepared to address the requirements listed in DA 67/98 Condition 13H(vii)(d) (refer to **Table 2-1** of the BMP), the DPIE *Draft Guidelines for the Preparation of Extraction Plans V5* (DPE, 2015), and regulatory requirements (refer to **Section 2.2** of the BMP). The BMP was prepared in consultation with the EES (refer to **Section 2.1.1**).

The BMP provides information on (but not limited to) the following:

- Baseline data for terrestrial vegetation communities (including threatened ecological communities, riparian vegetation, and vegetation condition), threatened flora and fauna, watercourses and stream morphology (including water table depth), aquatic biodiversity (**Section 3** of the BMP);
- Predicted subsidence impacts and environmental consequences to aquatic and terrestrial biodiversity (**Section 4** of the BMP);
- Performance measures and performance criteria for aquatic and terrestrial biodiversity (**Section 5.1** of the BMP);
- Biodiversity monitoring measures relating to aquatic biodiversity (water quality, aquatic habitats, macroinvertebrates) and terrestrial biodiversity (amphibian, riparian vegetation, and photo point monitoring) (**Table 5-3** of the BMP);
- Biodiversity management measures for aquatic and terrestrial biodiversity, with a specific focus on threatened species, populations and their habitats, and EECs (**Section 6.2** of the BMP); and
- TARPs to be implemented to manage and protect aquatic and terrestrial biodiversity (**Appendix A** of the BMP).

A summary of biodiversity monitoring measures is provided in **Section 5.3**, and biodiversity TARP actions are consolidated in **Appendix D**.

No threatened species or Threatened Ecological Communities were recorded in the Study Area during the monitoring surveys.

The following documents were prepared to support the BMP:

- Aquatic Biodiversity Technical Report (Niche, 2021a) –provides details of baseline data, monitoring and management measures, and TARPs for aquatic biodiversity in the LW W1-W2 Study Area; and
- Terrestrial Biodiversity Technical Report (Niche, 2021b) –provides details of baseline data, monitoring and management measures, and TARPs for terrestrial biodiversity in the LW W1-W2 Study Area.

The BMP and supporting documents are provided in **Volume 3** of this Extraction Plan.

## 4.6 Heritage Management Plan

A HMP for LW W3-W4 has been prepared to identify the monitoring and management measures for Aboriginal and historical heritage items within the Extraction Plan Study Area that are required to be implemented to demonstrate that the relevant performance measures are achieved. The HMP focused on Aboriginal and historical heritage items listed on heritage databases, and Aboriginal and historical heritage items identified in the Study Area during site investigations.

The HMP was prepared to address the requirements listed in DA 67/98 Condition 13H(vii)(f) (refer to **Table 2-1** of the HMP), the DPIE *Draft Guidelines for the Preparation of Extraction Plans V5* (DPE, 2015), and regulatory requirements (refer to **Section 2.2** of the HMP). The HMP was prepared in consultation with the Heritage NSW, EES and RAPs (refer to **Section 2.1.1**).

The HMP provides information on (but not limited to) the following:

- Baseline data for Aboriginal and historical heritage items (**Section 3** of the HMP);
- Predicted subsidence impacts and environmental consequences to Aboriginal and historical heritage items (**Section 4** of the HMP);
- Performance measures and performance criteria for Aboriginal and historical heritage items (**Section 5.1** of the HMP);
- Aboriginal and historical heritage monitoring measures (**Table 5-3** of the HMP);
- Management measures for Aboriginal and historical heritage items (**Section 6.2** of the HMP); and
- TARPs to be implemented to manage and protect Aboriginal and historical heritage (**Appendix A** of the HMP).

Aboriginal and historical heritage items located within the LW W3-W4 Study Area are identified on **Figure 4-4**. A summary of heritage monitoring measures is provided in **Section 5.3**, and heritage TARP actions are consolidated in **Appendix D**.

A survey targeting land in the LW W1-W4 Study Area where outcropping sandstone is predicted to occur was completed by EMM over four days (25-28 March 2019) in consultation with representatives from the RAP. The LW W3-W4 Study Area contains a total of eight registered Aboriginal heritage sites, including one grinding groove site, six open artefact sites, and one modified tree (**Figure 4-4**). There are a number of identified rockshelters that area located beside Cedar Creek and Matthews Creek, however are outside the Study Area and are located approximately 800 to 1.5 km from the LW W3-W4 footprint.

The monitoring measures relating to the grinding grooves site are detailed in the SCRMP as discussed below.

Six listed historical heritage sites have been identified within the Study Area, or are located in proximity to LW W3-W4 extraction such that they could experience far field or valley-related movements and could be sensitive to such movements. These identified heritage sites are:

- Mushroom Tunnel (Wollondilly Local Environment Plan (WLEP) – I144);
- Weatherboard Cottage (WLEP – I211);
- Redbank Uniting Church (WLEP – I146);
- Picton Tunnel (ARTC S170 Register as part of the Picton Railway Deviation Works);
- Antill Street Underbridge (ARTC S170 Register); and
- Rural landscape of Thirlmere Way (Department of Health S170 Register).

In addition, three listed heritage sites (Picton Viaduct, Argyle Street Underbridge and a pedestrian overbridge at 96.1 km) have been identified as potentially being sensitive to far field horizontal movements during extraction of LW W3-W4.

A site inspection of the Loop Line was completed by EMM on 29 March 2019 and focused on the section of the PMLL directly above the northern ends of LW W3-W4. Six culverts were recorded on the Loop Line within the Study Area, and while not listed on heritage registers, they have collective local significance. Other railway infrastructure with local significance currently unlisted on heritage registers located near LW W3-W4 include seven culverts on the MSR, the subway at 88.133, the Bridge on Matthews Lane, a high retaining wall, Prince Street Overbridge, and Connellan Crescent Overbridge (EMM, 2021b).

The following documents were prepared to support the HMP:

- Aboriginal Heritage Technical Report (EMM, 2021a) –provides details of baseline data, monitoring and management measures, and TARPs for Aboriginal heritage items in the LW W3-W4 Study Area and the surrounding area; and
- Historical Heritage Technical Report (EMM, 2021b) –provides details of baseline data, monitoring and management measures, and TARPs for historical heritage items in the LW W3-W4 Study Area and the surrounding area.

The HMP and supporting documents are provided in **Volume 3** of this Extraction Plan.

A management plan for the registered Aboriginal site, a grinding groove site located on a rockbar in Stonequarry Creek, has been developed in addition to the Heritage Management Plan. This management plan, the Stonequarry Creek Rockbar Management Plan, provides more detailed monitoring and management measures for this Aboriginal heritage site, and is provided in **Volume 3** of this Extraction Plan.

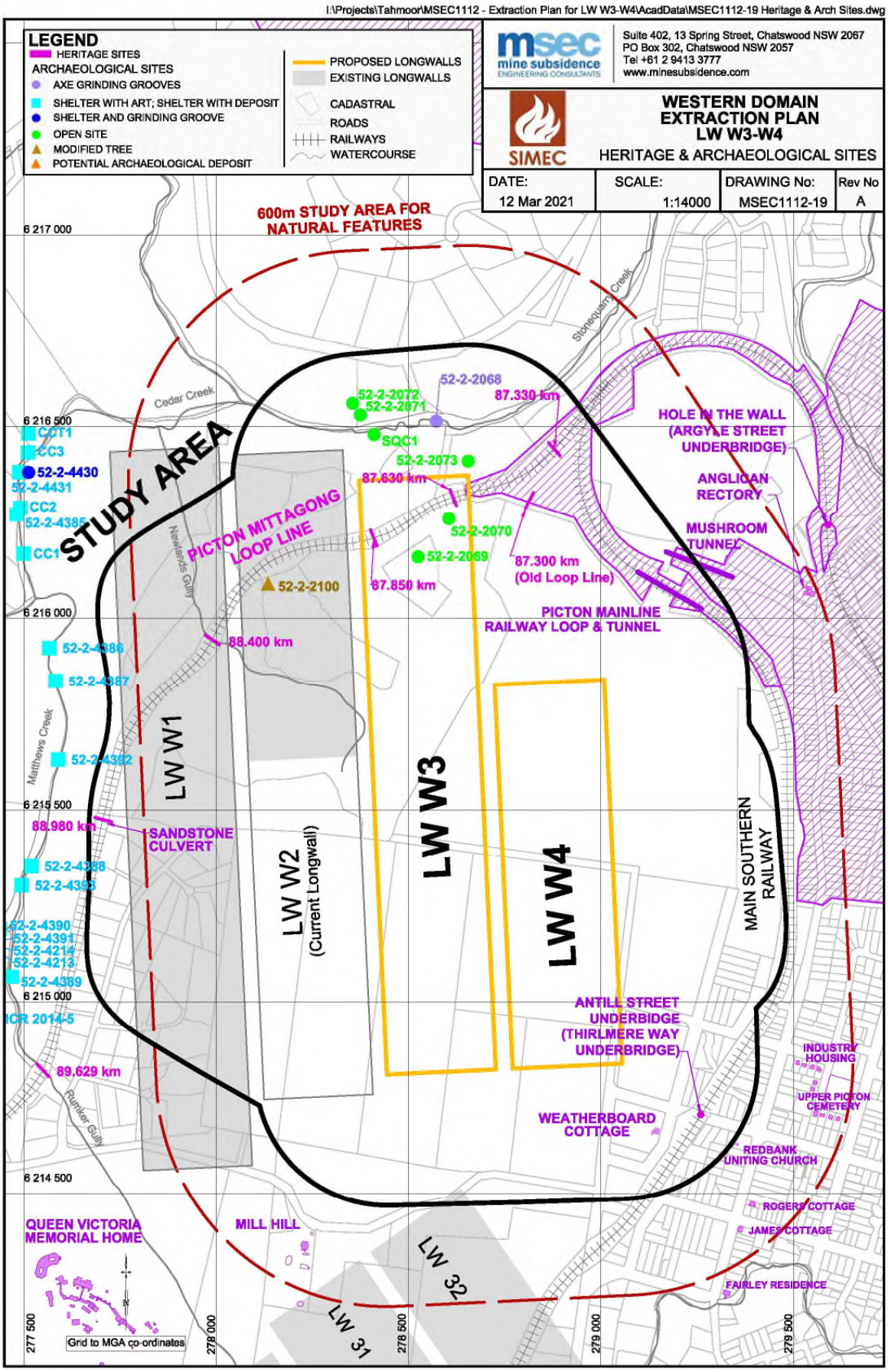



**Figure 4-4 Western Domain Extraction Plan LW W3-W4 – Heritage and Archaeological Sites (MSEC, 2021)**

## 4.7 Built Features Management Plan

A BFMP for LW W3-W4 has been prepared to identify the monitoring and management measures for all built features within the Extraction Plan Study Area that are required to be implemented to demonstrate that the relevant performance measures are achieved. The BFMP focused on the management of infrastructure (electrical, potable water, sewer, gas, telecommunications, roads, culverts, bridges, rail, and survey control marks), rural properties and structures (built structures, pools, septic tanks, and farm dams), and historical heritage buildings (e.g. Weatherboard Cottage).

The BFMP provides information on the key infrastructure items within the Study Area and which Infrastructure Management Plan to refer to with regards to monitoring and management of potential subsidence-related impacts for each built feature resulting from the extraction of LW W3-W4. Built features within the LW W3-W4 Study Area are also identified in **Section 6** of the Subsidence Predictions and Impact Assessment Report (MSEC, 2021; refer to **Appendix A** of this document).

The BFMP was prepared to address the requirements listed in DA 67/98 Condition 13H(vii)(b) (refer to **Table 2-1** of the BFMP), the DPIE *Draft Guidelines for the Preparation of Extraction Plans V5* (DPE, 2015), the Managing Risks of Subsidence Guide: WHS (Mines and Petroleum Sites) Legislation (Resources Regulator, 2017), and other regulatory requirements (refer to **Section 2** of the BFMP).

The BFMP was prepared in consultation with the Resources Regulator, ARTC, NRSR, WSC, and TfNSW (refer to **Section 2.1.1**).

A number of sub-plans for individual built features are currently being prepared. Further consultation with relevant stakeholders and infrastructure owners will be completed following the drafting of sub-plans for infrastructure management (refer to **Section 2.1.1**).

A series of sub-plans are currently being prepared for infrastructure, as summarised in **Table 3-1.** Each sub-plan will include a summary of potential risks, impact predictions and assessment, appropriate management and monitoring measures, and a detailed TARP for the infrastructure. The contents of each sub-plan will be prepared in consultation with the infrastructure owner and other relevant stakeholders. Following approval and signature by the infrastructure owner, each sub-plan will be submitted to DPIE and Resources Regulator for approval.

The BFMP is provided in **Volume 4** of this Extraction Plan.

## 4.8 Public Safety Management Plan

A PSMP for LW W3-W4 has been prepared to address all potential safety hazards to the public through the provision of management strategies, controls and monitoring programs to be implemented to manage potential risks from subsidence related impacts as a result of LW W3-W4 secondary extraction. Features located within the Extraction Plan Study Area that could pose a hazard to public safety are summarised in **Table 3-1.**

The PSMP was prepared to address the requirements listed in DA 67/98 Condition 13H(vii)(g) (refer to **Table 2-1** of the PSMP), the DPIE *Draft Guidelines for the Preparation of Extraction Plans V5* (DPE, 2015), the Managing Risks of Subsidence Guide: WHS (Mines and Petroleum Sites) Legislation (Department of Industry – Resources Regulator, 2017), requirements of the Work Health and Safety (Mines and Petroleum Sites ) Regulation 2014 (Clause 23 and 24), and other regulatory requirements (refer to **Section 2.2** of the PSMP). Regulatory requirements applicable to the PSMP to manage subsidence related risks to public safety are outlined further in **Section 2.2** of the PSMP.

Risk assessments undertaken in support of the development of the PSMP are detailed in **Section 4.2** of this Extraction Plan Main Document, and **Section 2.3** of the PSMP.

The PSMP was prepared in consultation with the Resources Regulator (refer to **Section 2.1.1**).

The PSMP provides information on (but not limited to) the following:

- Potential subsidence-related public safety hazards (**Section 3** of the PSMP); and
- Performance measures for public safety (**Section 4.1** of the PSMP).

Features identified within the Extraction Plan Study Area relevant to public safety are managed under a number of supporting plans in addition to the PSMP, as noted in **Table 3-1**. TARPs associated with these aspects are outlined in **Appendix D** of the Extraction Plan Main Document.

The following documents were prepared to support the PSMP:

- Geotechnical Assessment (Douglas Partners, 2021); and
- Subsidence Prediction and Impact Assessment Report (MSEC, 2021).

The PSMP and supporting documents are provided in **Volume 4** of this Extraction Plan.

# 5 Subsidence Monitoring Program

## 5.1 Monitoring Strategy and Approach

### 5.1.1 Subsidence Monitoring Program for LW W3-W4

An integrated Subsidence Monitoring Program (**Volume 4**) has been developed for LW W3-W4 as a component of this Extraction Plan in accordance with DA 67/98 Condition 13H(vii)(a). The Subsidence Monitoring Program sets out the program for the monitoring of subsidence movements and effects associated with second workings of LW W3-W4 and provides consolidated summaries for the monitoring of subsidence impacts and environmental consequences to environmental and built features.

The purpose of the Subsidence Monitoring Program is to:

- Demonstrate mine development and extraction are undertaken as per the mine design;
- Provide information to demonstrate that statutory performance measures are met;
- Target monitoring of environmental and built features within the Extraction Plan Study Area;
- Specifically manage the grinding groove site at Rockbar SR17;
- Meet stakeholder monitoring requirements for environmental features;
- Meet infrastructure owners monitoring requirements for built features;
- Provide appropriate information required to assess against triggers within the relevant TARPs, including data for trend analysis to inform adaptive management; and
- Provide a suitable basis for future Extraction Plans and associated monitoring programs required as part of Tahmoor Mine operations.

The Subsidence Monitoring Program is designed to ensure that a clear and concise monitoring program of all subsidence related effects, impacts and environmental consequences is implemented. The Subsidence Monitoring Program includes:

- A detailed program for subsidence movement and effects monitoring for LW W3-W4 using subsidence monitoring lines to measure both conventional and non-conventional vertical subsidence, tile and strain (tensile and compressive);
- A consolidated summary of built features monitoring as detailed within the BFMP and supporting sub-plans; and
- A consolidated summary of environmental monitoring for management of water (surface and groundwater), land, biodiversity, and heritage (Aboriginal and historical) as detailed in the management plans for this Extraction Plan.

The Subsidence Monitoring Program is scheduled and tracked by Tahmoor Coal according to longwall distance and/or scheduled dates. Tahmoor Coal will carry out surveys, inspections and notifications as scheduled, and the required actions will be assigned to the relevant role to ensure the subsidence monitoring program is achieved.

### 5.1.2 Summary of Monitoring in this Extraction Plan

The following sections provide a summary and re-presentation of monitoring details from the Subsidence Monitoring Program and other relevant management plans and sub-plans for the

monitoring of subsidence effects (**Section 5.2**), subsidence impacts and environmental consequences (**Section 5.3**) associated with the extraction of LW W3-W4.

Full detail pertaining to subsidence monitoring methodology can be found in the Subsidence Monitoring Program (**Volume 4**) and the relevant management plans and sub-plans discussed in the sections below.

## 5.2 Subsidence Effects Monitoring

The Subsidence Monitoring Program includes a monitoring program to evaluate subsidence effects as a result of LW W3-W4 extraction has been prepared in accordance with DA 67/98 Condition 13H(vii)(i) and the DPIE *Draft Guidelines for the Preparation of Extraction Plans V5* (DPE, 2015).

As a longwall progresses, subsidence begins to develop at a point in front of the active longwall face and continues to develop after the longwall passes. This is termed the 'active subsidence zone' for the purposes of this Extraction Plan. The active subsidence zone for each longwall is defined by the area bounded by the predicted 20 mm subsidence contour for the active longwall and a distance of 150 m in front of the active longwall face and 450 m behind the active longwall face. The active subsidence zone is illustrated in **Figure 5-1**.

Tahmoor Coal has established a monitoring network to monitor subsidence movements as a result of LW W3-W4. This network includes components of the previously established monitoring network used for the monitoring of previous longwalls in the Western Domain and to the south of the Western Domain. The layout of monitoring lines and points is illustrated in **Figure 5-2** as well as on A0 Plan 7 (**Volume 5**) and is discussed further in the Subsidence Monitoring Program (**Volume 4**).

The combined monitoring network consists of the following:

- Centrelines, including a line over the centreline of each panel;
- Crosslines, including numerous valley closure lines across the tops of the valley sides along Matthews, Cedar and Stonequarry Creeks;
- Monitoring points for key items including railway infrastructure associated with the Picton-Mittagong Loop Line; and
- Monitoring on private properties, dwellings, buildings and dams.

A centreline has been installed along the centrelines of LW W3, as shown in Figure 5-2. A centreline for LW W4 is planned to be installed along the centreline of LW W4 prior to the commencement of LW W3.

The purpose of the survey line is to establish the general magnitude and shape of surface subsidence along the centrelines of LW W3-W4. The observed subsidence movements will be used to provide early subsidence information to inform Tahmoor Coal and affected stakeholders. The information would assist Tahmoor Coal and affected stakeholders in considering whether any additional measures are required to manage potential impacts on the built features.

The information will also be used by Tahmoor Coal as part of its ongoing review of subsidence effects on natural features.

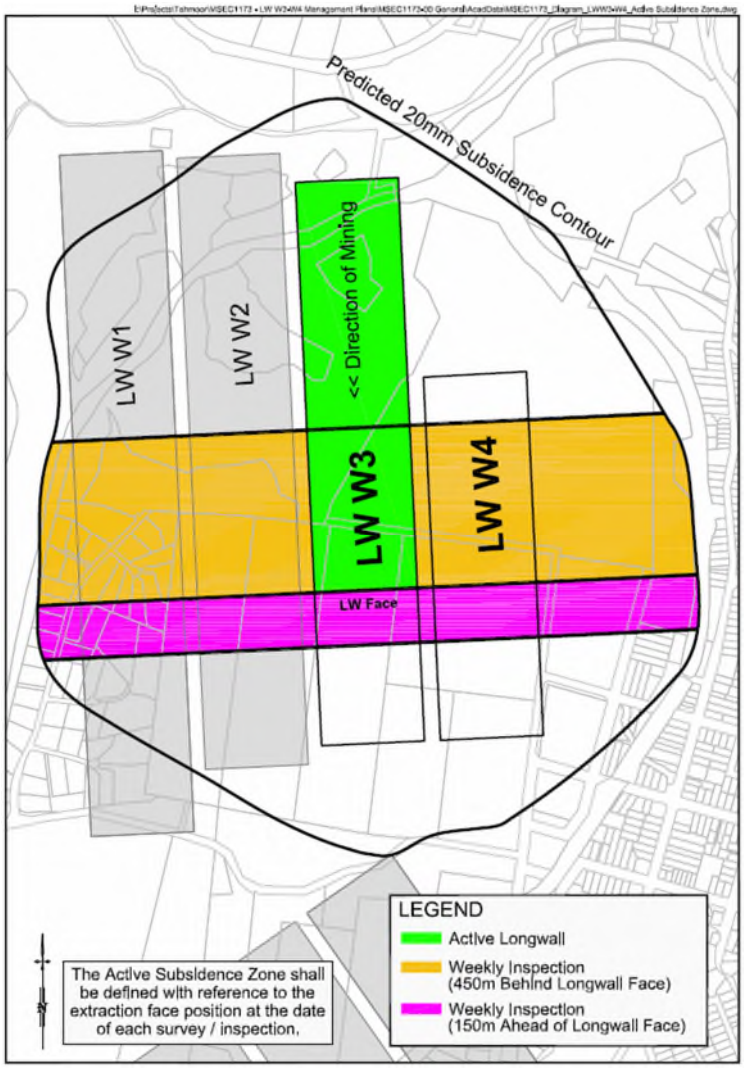



**Figure 5-1 Diagrammatic representation of 'active subsidence zone'**

The survey line will consist of pegs spaced nominally every 20 m, where possible. Surveys will measure levels and horizontal distances between adjacent pegs.

A GNSS unit will be installed approximately 100 m inside the commencing end of LW W3 (relocated from GNSS Site 22 above the commencing end of LW W2) to monitor the development of initial subsidence, which is expected to occur after the length of extraction exceeds approximately 200 m. The GNSS unit will then be relocated to approximately 100 m inside the commencing end of LW W4 prior to the start of LW W4. Additional GNSS units have been installed across Rockbar SR17 to monitor opening and closure particularly during the first 400m of LW W3 extraction.

Monthly ground surveys along the centreline of LW W3 will commence after 20 mm of vertical subsidence is measured by the GNSS unit, or the length of the extraction of LW W2 exceeds 200 m, whichever occurs first. All monitoring associated with rockbar SR17 commences at the start of LW W3.

A survey line has also been installed along a cross line that follows a property boundary that is approximately square to the proposed longwall panels. Access has been granted to install the survey marks along this line, part of which is on privately owned land. The survey line extends to Star Street, just east of the LW W4.

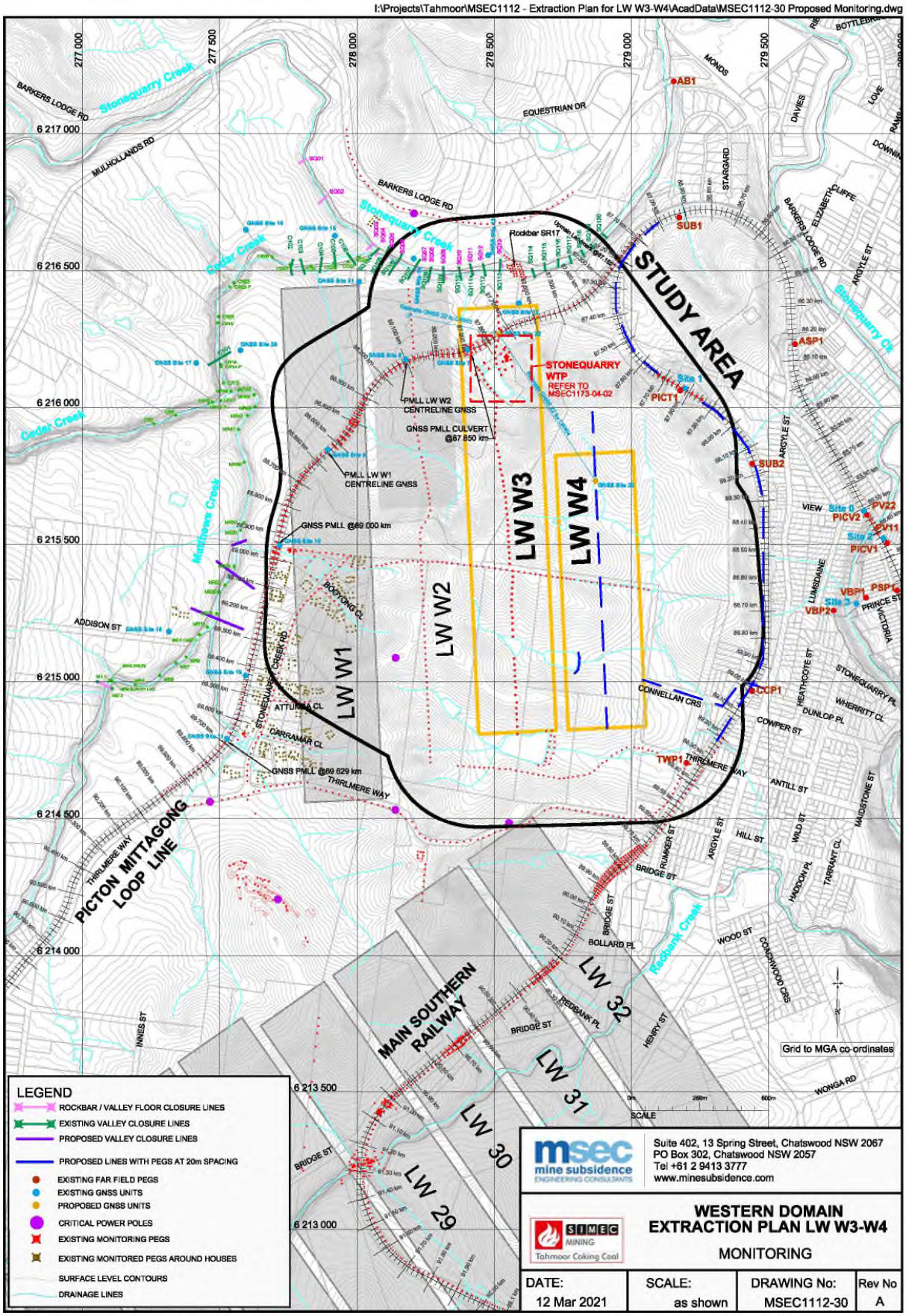



**Figure 5-2 Proposed Monitoring Locations for LW W3-W4 Extraction Plan Study Area (MSEC, 2021)**

## 5.3 Subsidence Impacts and Environmental Consequences Monitoring

A monitoring program to evaluate subsidence impacts and environmental consequences as a result of LW W3-W4 extraction has been prepared in accordance with DA 67/98 Condition 13H(vii)(i) and the DPIE *Draft Guidelines for the Preparation of Extraction Plans V5* (DPE, 2015).

### 5.3.1 Monitoring of Built Features

Built infrastructure in the Study Area, as described in **Section 4.7** of this Extraction Plan, are monitored and managed in accordance with dedicated supporting plans (sub-plans) developed for each type of built infrastructure specifically in consultation with the relevant stakeholders. The sub-plans for built infrastructure are managed collectively by the over-arching BFMP.

Monitoring of built features will include:

- Local roads and main infrastructure:
  - Survey lines along WSC-managed local roads, Sydney Water potable water and sewer pipelines, Jemena gas pipelines, Endeavour Energy electrical infrastructure, Telstra and NBN telecommunications infrastructure, and privately-owned sewerage infrastructure. Survey lines will consist of pegs spaced nominally every 20 m, with survey measuring levels and horizontal distances between adjacent pegs;
  - Visual inspections along local roads;
  - Optical Time Domain Reflectometer (OTDR) monitoring for optical fibre cables;
  - Monthly survey monitoring of six critical electrical poles;
- Structures:
  - Specific ground surveys for selected properties, including the heritage-listed Weatherboard Cottage;
  - Visual inspections of residential structures that are either:
    - Located on or adjacent to steep slopes;
    - Are in poor existing condition (based on the hazard identification inspections);
    - Have previously reported impacts; and/or
    - Where recommended by the Structures Response Group;
  - Visual inspections of pool fences and gates;
  - Visual inspections of commercial, industrial and business establishments, public amenities and public utilities;
- PMLL:
  - Ground surveys along rail corridor;
  - Ground surveys at culverts and embankments;
  - Ground surveys at railway cuttings;
  - GNSS monitoring;
  - Track geometry monitoring;
  - Visual inspection;
- MSR:
  - Continue monitoring at key items of railway infrastructure as part of the far field monitoring program, which will include absolute 3D surveys, continuous GNSS monitoring,

and baseline structural surveys and additional monitoring as defined in the MSR Management plan.

A consolidated summary of the monitoring of built features is presented in **Section 3** of the Subsidence Monitoring Program, and location of built features monitoring is illustrated in **Figure 5-2**.

### 5.3.2 Monitoring of Environmental Features

Monitoring and evaluation of subsidence performance measures and potential mining related impacts on surface water, groundwater, surface water, landscape features, flora and fauna, Aboriginal and European heritage, are described in detail in the Section 5.2 of each of the WMP, LMP, BMP and HMP.

Monitoring of environmental features will include:

- Creeks:
  - Ground surveys of valley closure lines, with a pair of pegs placed on or near the crests of the valleys where there are adequate lines of sight available;
  - GNSS monitoring;
  - 3D survey lines;
  - Surface water monitoring at 8 sites on Matthews Creek, 11 sites on Cedar Creek, and 9 sites on Stonequarry Creek. This monitoring will include water level and water quality monitoring;
  - Visual monitoring;
- Rockbar SR17 on Stonequarry Creek:
  - Refer TAH-HSEC-352 Tahmoor North - Western Domain, LW W3-W4 Stonequarry Creek Rockbar Management Plan (SCRMP).
- Groundwater:
  - Monitoring of groundwater levels and quality;
- Steep slopes:
  - Visual monitoring;
- Biodiversity:
  - Bi-annual monitoring of amphibians, riparian vegetation, and aquatic biodiversity;
- Aboriginal heritage sites:
  - Visual inspection;
- Historical heritage sites:
  - Monitoring as per built features monitoring; and
  - Visual inspection.

The location of the biodiversity monitoring is illustrated in **Figure 5-3**, and the location of surface water monitoring and groundwater monitoring is illustrated in **Figure 5-4** and **Figure 5-5**, respectively.

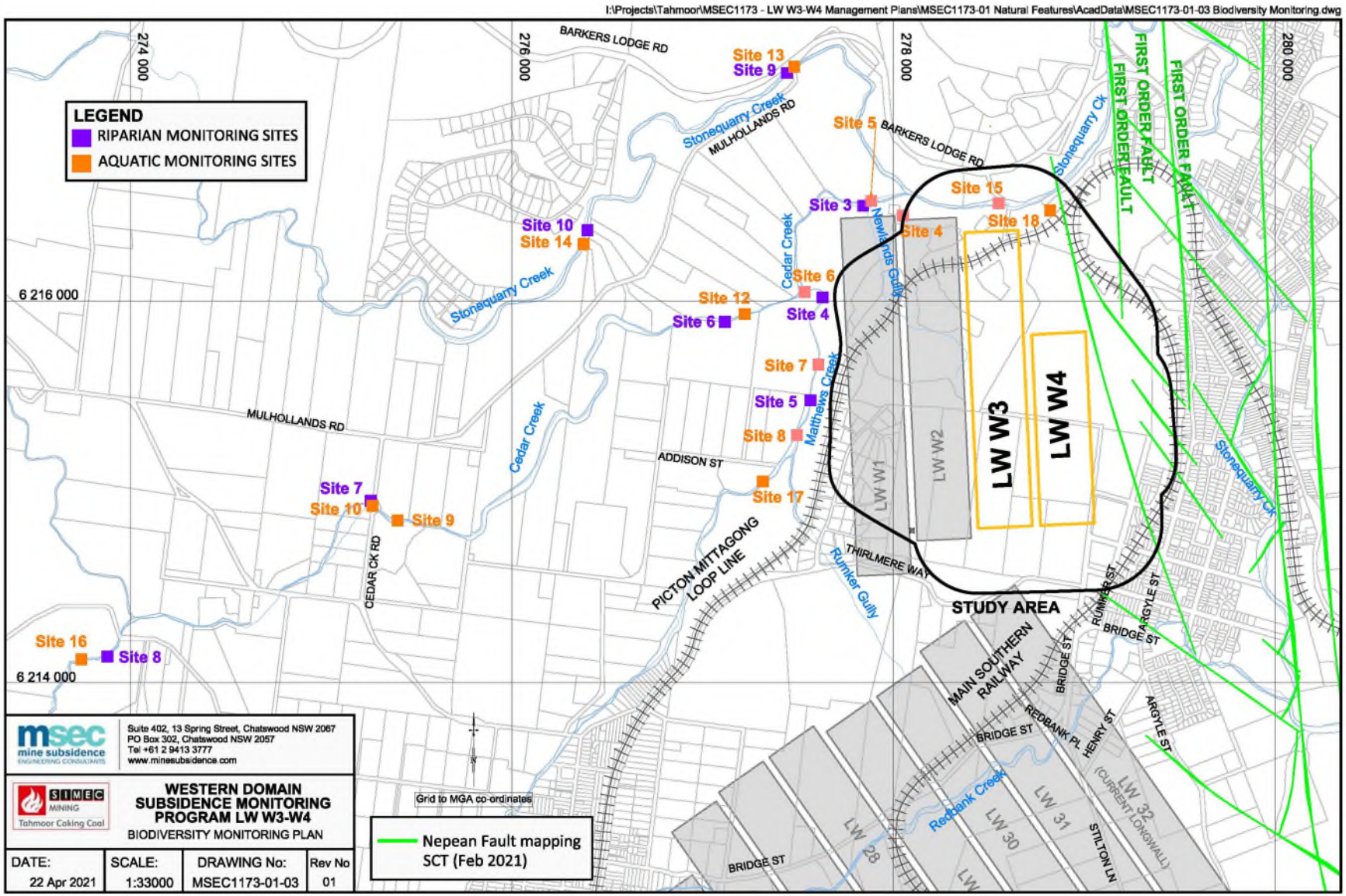



**Figure 5-3 Biodiversity Monitoring Program (prepared by MSEC)**

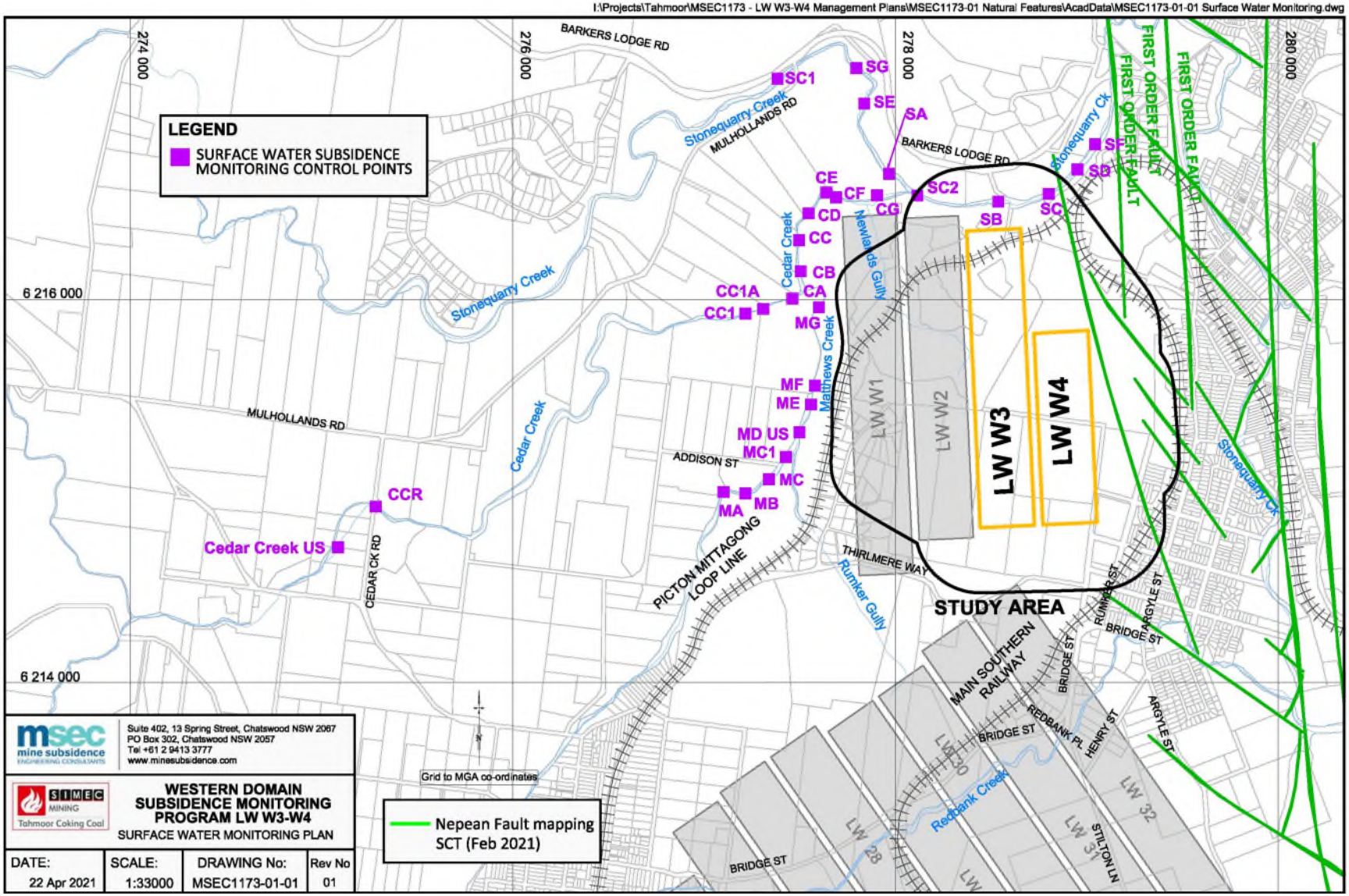



**Figure 5-4 Surface Water Monitoring Program (prepared by MSEC)**

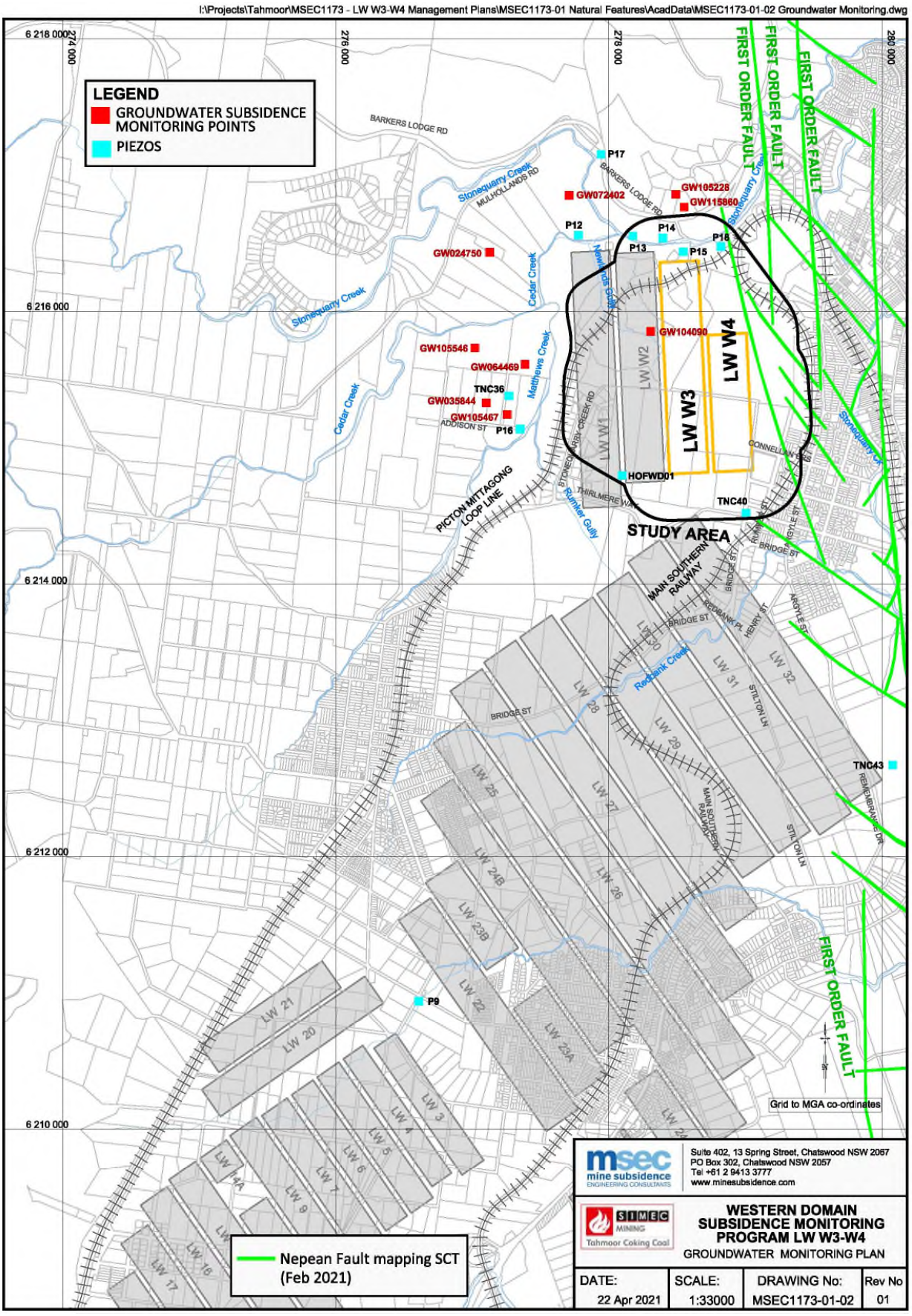



**Figure 5-5 Groundwater Monitoring Program (prepared by MSEC)**

## 5.4 Baseline Monitoring to Support Future Extraction Plans

Tahmoor Coal is not planning to extract any further longwalls in the Western Domain. However, monitoring data collected during the extraction of LW W3-W4 will be used as baseline data to support any future longwall extraction projects. If future longwall extraction is proposed as part of the Tahmoor Mine operations, extraction plans will be lodged for these longwalls in accordance with the relevant conditions of consent.

A monitoring program to collect sufficient baseline data for future extraction plans is summarized in **Table 5-1**, in accordance with DA 67/98 Condition 13H(vii)(i) and the DPIE *Draft Guidelines for the Preparation of Extraction Plans* V5 (DPE, 2015). This monitoring program has been consolidated from the various key component plans and this monitoring program will be used as reference site data for future longwalls. In addition, monitoring data collected during the mining of LW W3-W4 would be used in the review of observed subsidence impacts and environmental consequences for future extraction plans.

**Table 5-1 Baseline Monitoring Program to Support Future Extraction Plans**

| Aspect of Future Extraction Plan | Existing and Proposed Monitoring Programs | Tahmoor Coal Document Reference |
|---|---|---|
| Subsidence | • Subsidence monitoring undertaken in accordance with the Subsidence Monitoring Program.<br>• A significant amount of baseline data has been collected during the extraction of the previous longwall panels in the Western Domain and to the south of the Western Domain. | Subsidence Monitoring Program |
| Surface Water | • Surface water monitoring (flow and quality) will be undertaken in accordance with the WMP. This data will provide baseline reference data for future longwalls.<br>• A significant amount of baseline surface water data has been collected during the extraction of the previous longwall panels in the Western Domain and to the south of the Western Domain, as well as baseline data from the Tahmoor South Domain. | WMP |
| Groundwater | • Groundwater monitoring (groundwater level and quality) undertaken in accordance with the WMP.<br>• A significant amount of baseline groundwater data has been collected during the extraction of the previous longwall panels in the Western Domain and to the south of the Western Domain, as well as baseline data from the Tahmoor South Domain. | WMP |
| Landscape | • Monitoring of impacts to steep slopes in accordance with the LMP.<br>• A significant amount of baseline landscape feature data for cliffs, steep slopes and rock face features has been collected during the extraction of the previous longwall panels in the Western Domain. | LMP |
| Biodiversity | • Biodiversity monitoring of aquatic habitat, macroinvertebrates, riparian vegetation, and amphibians in accordance with the BMP. | BMP |

| Aspect of Future Extraction Plan | Existing and Proposed Monitoring Programs | Tahmoor Coal Document Reference |
|---|---|---|
| | • A significant amount of baseline ecology data has been collected during the extraction of the previous longwall panels in the Western Domain and to the south of the Western Domain, as well as baseline data from the Tahmoor South Domain. | |
| Aboriginal Heritage | • Monitoring of Aboriginal heritage items in accordance with the HMP and the SCRMP.<br>• A significant amount of baseline Aboriginal heritage data has been collected during the extraction of the previous longwall panels in the Western Domain and to the south of the Western Domain, as well as baseline data from the Tahmoor South Domain. | HMP |
| Historical Heritage | • Monitoring of historical heritage items in accordance with the HMP.<br>• A significant amount of baseline Historical heritage data has been collected during the extraction of the previous longwall panels in the Western Domain and to the south of the Western Domain, as well as baseline data from the Tahmoor South Domain. | HMP |

# 6 Implementation

## 6.1 Reporting

### 6.1.1 Summary of Reporting

Reporting for the Extraction Plan is undertaken in accordance with the specific requirements of relevant approvals and licences including DA 57/93 and DA 67/98, and generally in accordance with the DPIE *Draft Guidelines for the Preparation of Extraction Plans* V5 (DPE, 2015) and the requirements of the WHSMP Regulation.

Reporting requirements are summarised in **Table 6-1** including which government stakeholders will receive copies of each report and the method of distribution. Further details of the reporting requirements are provided in the following sections.

**Table 6-1 Reporting Requirements**

| Report | Trigger | Requirements | Distribution | Distribution Method | Responsibility |
|---|---|---|---|---|---|
| Incident Reporting (Letter Report)<br><br>Refer to Section 6.1.2 for further details | Any occasion or incident in accordance with DA 57/93, DA 67/98, WHS Regulations (Mines and Petroleum Sites) Clause 128 or Clause 179, or as triggered by the TARP. | Detailed report to be provided to DPIE on the incident within seven days of the incident (and to EPA where potential or actual material harm to environment).<br>Any additional notifications and reporting as per relevant approved TARP, including actions being undertaken to prevent recurrence.<br>Includes non-compliance with any statutory requirements or exceedance of performance measures. | • DPIE (Resource Assessments);<br>• Resources Regulator (Subsidence);<br>• Resources Regulator (Mining Act Inspectorate);<br>• MEG;<br>• SA NSW;<br>• NRAR;<br>• EPA;<br>• WSC;<br>• TCCCC; and<br>• Relevant infrastructure owner (Endeavour Energy, Sydney Water, Stonequarry Wastewater Treatment Plant, Jemena, Telstra, NBN, ARTC, Rail Transport Museum, Spatial Services). | • Electronic copy sent by email<br>• Lodged on DPIE Planning Portal | Environment and Community Manager |
| Six Monthly Subsidence Impact Reporting<br><br>Refer to Section 6.1.3 for further details | Every six months during mining of LW W1-W2, according to Section 6 of the Extraction Plan Guidelines. | Report to include:<br>• Summary of all impacts, including a revised characterisation according to the relevant TARP(s);<br>• Any proposed actions resulting from triggers being met in the TARP, or other actions;<br>• Assessment of compliance with performance measures and indicators; and<br>• A comprehensive summary of all quantitative and qualitative environmental monitoring results, including landscape monitoring, water quality data, water flow and pool level data, piezometer readings, etc. | • DPIE (Resource Assessments);<br>• Resources Regulator (Subsidence);<br>• Resources Regulator (Mining Act Inspectorate);<br>• MEG;<br>• SA NSW;<br>• NRAR;<br>• EPA;<br>• WSC; and<br>• TCCCC. | • Electronic copy sent by email<br>• Lodged on DPIE Planning Portal | Environment and Community Manager |

| Report | Trigger | Requirements | Distribution | Distribution Method | Responsibility |
|---|---|---|---|---|---|
| Annual Review<br><br>Refer to Section 6.1.4 for further details | Annual Report required by 31 March of each year under development consent. | In accordance with the requirements of DA 67/98 Condition 45.<br>Report to include:<br>• Six-monthly reports of impacts and environmental monitoring results;<br>• Monitoring results; and<br>• Summary of subsidence impacts. | • DPIE (Resource Assessments);<br>• Resources Regulator (Subsidence);<br>• Resources Regulator (Mining Act Inspectorate);<br>• WSC; and<br>• TCCCC. | • Electronic copy sent by email<br>• Lodged on DPIE Planning Portal | Environment and Community Manager |
| Annual Return<br><br>Refer to Section 6.1.5 for further details | Annual Return required by 28 February of each year under EPL 1389. | In accordance with the requirements of EPL 1389.<br>Report to include:<br>• Statement of Compliance; and<br>• Monitoring and complaints summary. | • EPA | • Lodged to EPA portal | Environment and Community Manager |
| Tahmoor Colliery Community Consultative Committee (TCCCC)<br><br>Refer to Section 6.1.6 for further details | TCCCCC meetings are held quarterly in accordance with DA 67/98 Condition 47. | Agenda to include subsidence and environmental performance for Tahmoor Mine. | • TCCCC | • Presented at meeting | Community Liaison Specialist |
| Adaptive Management Report | After 1,000 metres of LW W2 extraction, and at least 2 months prior to | The report provided and the outcomes of the adaptive management strategy review, as well as detailed justification for the retainment of the commencement position | • DPIE | • Electronic copy sent by email<br>• Lodged on DPIE Planning | Environment and Community Manager |

| Report | Trigger | Requirements | Distribution | Distribution Method | Responsibility |
|---|---|---|---|---|---|
| Refer to Section 3.6.4 for further details | commencement of LW W3 extraction | of LW W3 with reference to observed and predicted impacts. | | | |

### 6.1.2 Incident Reporting

In accordance with Condition 48 of DA 67/98, Tahmoor Coal will notify the Secretary of the DPIE and any other relevant agencies of any incident resulting from the extraction of LW W3-W4 that has caused, or has the potential to cause, significant risk of material harm to the environment as soon as practicable after becoming aware of the incident.

Within seven days of the incident, Tahmoor Coal shall provide the DPIE and any relevant agencies with a detailed report on the incident that includes:

- Date, time and nature of the incident;
- Identification of the likely cause of the incident;
- Description of the response action that has been undertaken to date; and
- Description of the proposed management measures to address the incident.

For any other incident associated with the development or the trigger of relevant TARP(s), Tahmoor Coal shall notify the Secretary and any other relevant agencies or infrastructure owners as soon as practicable after Tahmoor Coal becomes aware of the incident. Tahmoor Coal will implement further actions required under the TARP(s) as soon as practicable in consultation with the relevant stakeholders.

Incident report will also be undertaken to satisfy Clause 128 of the WHSMP Regulation regarding duty to notify regulator of certain incidents, as detailed in **Section 3.2.4** of this Extraction Plan. This includes reporting of a high potential incident as defined by any of the following:

- Clause 128 (m) – any indication from monitoring data of the development of subsidence which may result in any incident referred to in clause:
  - Clause 179 (a) (xvi) – a failure of ground, or of slope stability control measures; or
  - Clause 179 (a) (xvii) – rock falls, instability of cliffs, steep slopes or natural dams, occurrence of sinkholes, development of surface cracking or deformations or release of gas at the surface, due to subsidence.

All incidents will be reported in the Annual Review and the Six Monthly Subsidence Impact Report.

Incident reporting and all external notification will be undertaken in accordance with **Section 4.6** of the Tahmoor Coal Environmental Management System Framework (TAH-HSEC-00173), and in accordance with the Tahmoor Coal Pollution Incident Response Management Plan (PIRMP, TAH-HSEC-00155). A record of all incidents and non-compliance investigations is maintained in Tahmoor Coal's Compliance Management System.

### 6.1.3 Six-monthly Subsidence Impact Reporting

Tahmoor Coal will undertake six-monthly subsidence impact reporting in accordance with the DPIE Guidelines (2015). This reporting will form the basis for inclusion in annual review reporting and will include a discussion of all impacts and environmental monitoring results during extraction of LW W3-W4 including:

- A comprehensive summary of all impacts, including a revised characterisation according to the relevant TARP(s);
- Any proposed actions resulting from triggers being met in the TARP, or other actions;
- An assessment of compliance with all relevant performance measures and indicators; and

- A comprehensive summary of all quantitative and qualitative environmental monitoring results, including landscape monitoring, water quality data, water flow and level data, piezometer readings.

### 6.1.4 Annual Review

An Annual Review is required to be completed by 31 March each year in accordance with Condition 45 of DA 67/98 and the MOP, and to the satisfaction of the Secretary of the DPIE. The Annual Review includes the following:

- A description of the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the next year;
- A comprehensive review of the monitoring results and complaints records of the Tahmoor Mine over the past calendar year, which includes a comparison of these results against:
  - Relevant statutory requirements, limits or performance measures/criteria;
  - Requirements of any plan or program required under this consent;
  - Monitoring results of previous years;
  - Relevant predictions in the documents listed in condition 1(i) of Schedule 2;
- Identification of any non-compliance over the past year, and a description of what actions were (or are being) taken to ensure compliance;
- Identification of any trends in the monitoring data over the life of the Tahmoor Mine;
- Identification of any discrepancies between the predicted and actual impacts of the Tahmoor Mine, and analysis of the potential cause of any significant discrepancies;
- A description of what measures will be implemented over the next year to improve the environmental performance of the Tahmoor Mine; and
- An assessment of the performance of the mine against the conditions of the consent and other licences and approvals relating to the mine.

Six-monthly reporting undertaken as described in **Section 6.1.3** will form the basis for subsidence impact reporting components for future Annual Reviews as per the DPIE Guidelines (2015), and the Annual Review will also include a summary of environmental effects monitoring as required by the DPIE Guidelines (2015).

The Annual Review is completed in accordance with the post-approval requirements for State significant mining developments and incorporates reporting requirements of the Resources Regulator.

The Annual Review is also undertaken in accordance with the requirements of the MOP for ML 1376 and ML 1539. Additionally, the Annual Review is required as part of the Tahmoor Coal Environmental Management System Framework (TAH-HSEC-00173).

All Annual Reviews are made publicly available on the Tahmoor Coal website.

### 6.1.5 Annual Return

An Annual Return stating Tahmoor Mine's compliance with the conditions of EPL 1389 and summarising monitoring results and complaints is completed and submitted to the EPA by 28 February of each year. Each Annual Return is lodged via the EPL portal.

### 6.1.6 Community Consultative Committee

The TCCCC was established in 2003 in response to the requirement for DA 67/98 Condition 47 to establish and operate a Community Consultative Committee in general accordance with DPIE *Community Consultative Committee Guidelines: State Significant Projects (2016)*. The TCCCC meets on a quarterly basis and provides a forum of two-way communication between community representatives and Tahmoor Coal. Some of the information reported at the TCCCC includes:

- Progress at the mine and operational issues;
- Activities, projects and community initiatives;
- Subsidence monitoring and environmental performance; and
- Community complaints and the response to complaints.

A record of consultation with the TCCCC during the preparation of this Extraction Plan is provided in **Table 2-2**.

### 6.1.7 Adaptive Management Reporting

Tahmoor Coal submitted an Adaptive Management Report to DPIE prior to the commencement of extraction of LW W3.

The Adaptive Management Report included a summary of the following information:

- Tahmoor Coal's performance under the LW W1-W2 Extraction Plan and approval;
- Implementation of the revised Water Management Plan TARP; and
- Outcomes of the adaptive management strategy discussed in **Section 3.6.4**.

The Adaptive Management Report found that there had been no exceedances of the subsidence impact performance measures, and a modification of the starting position of LW W3 was not proposed.

Tahmoor Coal will include a review of the performance measures in the Annual Report following the completion of each longwall. This review will enable Tahmoor Coal to monitor compliance with the performance measures for Stonequarry Creek, Cedar Creek and Matthews Creek as set out in Condition 1 of the LW W1-W2 Extraction Plan approval conditions.

### 6.1.8 Online Publications

In accordance with Conditions 49 and 52 of DA 67/98, Tahmoor Coal makes the following documents publicly available on the Tahmoor Coal website:

- All relevant statutory approvals for the Tahmoor Mine;
- All approved strategies, plans and programs required under DA 67/98 following approval by the DPIE;
- A comprehensive summary of the monitoring results of the Tahmoor Mine;
- A complaints register updated on a monthly basis;
- Minutes of TCCCC meetings;
- Annual Review documents;
- Independent Environmental Audits of the Tahmoor Mine, and Tahmoor Coal's response to the recommendations in the audits; and
- Any other matter required by the Secretary.

This Extraction Plan and associated documents will be uploaded to the Tahmoor Coal website following approval by DPIE.

### 6.1.9 Complaints Management

Complaints will be managed in accordance with the Tahmoor Coal's *Community Complaint and Enquiry Procedure* (TAH-HSEC-00120).

## 6.2 Review and Auditing

### 6.2.1 Review of Extraction Plan

This Extraction Plan will be reviewed annually or at the end of each panel, or in the event that the following occurs:

- Stakeholders raise issues that necessitate a review;
- Relevant statutory changes affect management requirements (e.g. modification to related approvals or licences);
- Significant change in mine design or layout;
- Unpredicted subsidence impacts or environmental consequences have required implementation of contingency actions under this Extraction Plan;
- Approval and receipt of consent conditions for an Aboriginal Heritage Impact Permit for LW W3-W4;
- Development Consent requirements trigger a review;
- Circumstances in either Clause 10, Clause 38 and/or Clause 128 of the WHSMP Regulation (refer to **Section 3.2.4** of this Extraction Plan for further detail); and
- Monitoring, incident or audit processes demonstrate that a review is warranted.

Regular review of the Extraction Plan and/or any associated documents is required by Condition 46 of DA 67/98. In particular, Tahmoor Coal is required to review, and if necessary revise, the strategies, plans, and programs of this Extraction Plan within 3 months of the submission of:

- Annual Review under DA 67/98 Condition 45 (refer to **Section 6.1.4** of this Extraction Plan);
- Incident Report under DA 67/98 Condition 48 (refer to **Section 6.1.2** of this Extraction Plan);
- Audit Report under DA 67/98 Condition 50 (refer to **Section 6.2.4** of this Extraction Plan); and
- Any modification to the conditions of DA 67/98 (unless the conditions require otherwise).

Amendments to the Extraction Plan will be undertaken in consultation with relevant stakeholders. Following changes (or as otherwise required above) a copy of the amended Extraction Plan will be forwarded to the Secretary of the DPIE for approval.

### 6.2.2 Review of Other Management Plans

The Key Component Plans prepared in support of this Extraction Plan (refer to **Section 4**) are also subject to individual review requirements in accordance with DA 67/98 as detailed within each plan (refer to **Volumes 2-4** of this Extraction Plan). Amendments to the Key Component Plans will be undertaken in consultation with relevant stakeholders. Following changes (or as otherwise required above) a copy of the amended Key Component Plan(s) will be forwarded to the Secretary of the DPIE for approval.

The review of other management plans that apply more broadly to the whole mine site, such as the *Mining Operations Plan* (TAH-HSEC-00026) and the *Environmental Management System Framework* (TAH-HSEC-00173), may be required following the completion of this Extraction Plan.

The process for review of these documents will be in according to Tahmoor Coal's *Document and Record Control* (TAH-HSEC-00124).

### 6.2.3 Response Groups

Tahmoor Coal operates three response groups made up of Tahmoor Coal Staff and relevant technical specialists, and these groups are:

- Environmental Response Group (ERG);
- Structural Response Group (SRG);
- Rail Response Group (RRG); and
- Stonequarry Creek Technical Committee.

The response groups are responsible for taking the necessary actions required to manage the risks that are identified from monitoring of natural and built features to ensure that the health and safety of people and the environment are not put at risk due to mine subsidence. Each response group assists in the development and review management plans, collects and analyses monitoring results, determines potential impacts, and provides advice regarding appropriate actions relevant to the area of interest.

Each response group is made up of a group of key members, and the response group may invite other specialist consultants and stakeholders depending on the topic of conversation. Each group meets regularly and outcomes of the meetings are documented.

### 6.2.4 Environmental Auditing

The requirements of this Extraction Plan are to be audited during the implementation of the plan to identify any issues that may affect its integrity and effectiveness. Any non-conformances or deficiencies found during the audit are to be brought to the attention of the Environment and Community Manager so that corrective actions can be outlined. Corrective actions are allocated within Tahmoor Coal's Compliance Management Software.

Independent Environmental Audits of the operation are undertaken every three years by 30 September of the year in accordance with Conditions 50 and 51 of DA 67/98.

Additionally, auditing will be undertaken in accordance with:

- *Health and Safety Management Plan* (TAH-HSEC-00189); and
- *Environmental Management System Framework* (EMSF; TAH-HSEC-00173).

### 6.2.5 Document Control

This Extraction Plan includes Document Control details as part of the document quality assurance and control (QA/QC). This Extraction Plan includes the following Document Control information:

- Document details including author(s), revision numbers, dates and status (refer to Document Control table at start of this Extraction Plan, and **Section 8.5**);
- Revision, approval and authorisation details (refer to Document Control table at the start of this Extraction Plan, and **Section 8.5**); and
- Distribution details including the provision to external stakeholders (refer to **Section 8.6** of this Extraction Plan).

All revisions of this Extraction Plan are stored on Tahmoor Coal's Document Control Software, Intelex, and are updated in accordance with Tahmoor Coal's *Document and Record Control* (TAH-HSEC-00124) and *Change Management* (TAH-HSEC-00171) documents.

## 6.3 Roles and Responsibilities

The responsibility for implementation, monitoring and review of the Extraction Plan lies with Tahmoor Coal. The roles and responsibilities for the LW W3-W4 Extraction Plan are outlined below in **Table 6-2**.

**Table 6-2 Roles and Responsibilities**

| Position | Responsibilities |
|---|---|
| General Manager | • Approve the Extraction Plan and associated documents;<br>• Approve revised versions of the Extraction Plan and associated documents as required; and<br>• Ensure sufficient resources are available to implement and execute the requirements of this Extraction Plan. |
| Mining Engineering Manager | • Approve the Extraction Plan and associated documents;<br>• Approve revised versions of the Extraction Plan and associated documents as required; and<br>• Ensure underground mining activities are conducted in accordance with the Extraction Plan. |
| Environment and Community Manager | • Approve the Extraction Plan and associated documents;<br>• Approve reports as required by this Extraction Plan;<br>• Approve revised versions of the Extraction Plan and associated documents as required;<br>• Liaise with Government agencies and infrastructure owners in relation to subsidence matters, subsidence predictions and monitoring program of this Extraction Plan;<br>• Project reporting;<br>• Ensure the effective implementation of strategies designed to reduce impacts from excavation of longwalls discussed in this Extraction Plan;<br>• Ensure the Subsidence Monitoring Program and this Extraction Plan are implemented;<br>• Ensure monitoring required under the Subsidence Monitoring Program and this Extraction Plan are carried out within specified timeframes, are adequately checked and processed, and are prepared to the required standard;<br>• Monitor and review subsidence monitoring survey results;<br>• Ensure any potential or actual issues, triggers and non-conformances are reported in accordance with the Extraction Plan, other legal requirements and corporate standards;<br>• Implement subsidence management actions required by the Extraction Plan in the event that the TARPs are triggered;<br>• Review and approve reports as required by this Extraction Plan;<br>• Review and approve revised versions of the Extraction Plan and associated documents in accordance with the review requirements outlined in this Extraction Plan and other legal requirements and operational standards; and<br>• Coordinate external audits, corporate reporting and management. |
| Community Liaison Specialist | • Liaise with land owners, landholders and managers in relation to potential environmental consequences of subsidence and in relation to access for the Subsidence Monitoring Program and any remediation works;<br>• Notify and liaise with the Community in relation to mining timing and monitoring performance; |

| Position | Responsibilities |
|---|---|
| | • Consult with relevant stakeholders during the review process of this Extraction Plan;<br>• Maintain the complaints register; and<br>• Install and maintain signage. |
| Approvals Specialist | • Prepare and coordinate this Extraction Plan and associated documents;<br>• Prepare and coordinate reports as required by this Extraction Plan;<br>• Review and audit the Extraction Plan as required;<br>• Prepare subsequent revisions of this Extraction Plan and associated documents as required;<br>• Review and assess subsidence monitoring results against predictions;<br>• Investigate any exceedances;<br>• Report any exceedances to the Environment and Community Manager;<br>• Assist the Environment and Community Manager in the implementation of the Subsidence Monitoring Program and this Extraction Plan;<br>• Assist the Environment and Community Manager in monitoring and reviewing subsidence monitoring survey results;<br>• Notify the Environment and Community Manager of any exceedance of performance indicators in accordance with the TARPs; and<br>• Assist in the implementation of subsidence management actions required by the Extraction Plan. |
| Environmental Specialist | • Assist in the preparation and coordination of reports as required by this Extraction Plan;<br>• Assist in the review and audit of this Extraction Plan and associated documents as required;<br>• Assist in the revision of this Extraction Plan and associated documents as required;<br>• Review and assess subsidence monitoring results against predictions;<br>• Investigate any exceedances;<br>• Report any exceedances to the Environment and Community Manager;<br>• Assist the Environment and Community Manager in the implementation of the Subsidence Monitoring Program and this Extraction Plan;<br>• Assist the Environment and Community Manager in monitoring and reviewing subsidence monitoring survey results;<br>• Notify the Environment and Community Manager of any exceedance of performance indicators in accordance with the TARPs; and<br>• Assist in the implementation of subsidence management actions required by the Extraction Plan. |
| Surveyor | • Coordinate with the Environment and Community Manager to gain access for subsidence monitoring;<br>• Establish subsidence monitoring in accordance with the Subsidence Monitoring Program; and<br>• Undertake subsidence effects monitoring in accordance with the Subsidence Monitoring Program to the required survey standard within the specified timeframes. |
| Mine Subsidence Engineer | • Ensure monitoring data are adequately checked, processed and recorded;<br>• Provide monitoring results to the Environment and Community Manager, relevant agencies and infrastructure owners;<br>• Review and assess subsidence monitoring results against predictions;<br>• Investigate any exceedances;<br>• Report any exceedances to the Environment and Community Manager;<br>• Notify the Environment and Community Manager of any identified public safety issues; and<br>• Review the Subsidence Monitoring Program and other documents as required. |
| All employees and contractors | • Comply with all requirements of this Extraction Plan; |

| Position | Responsibilities |
|---|---|
| | • Undertake all works in accordance with this Extraction Plan and associated documents, and all other Tahmoor Coal systems; and<br>• Report all potential environmental incidents to their supervisor immediately. |

# 7 Graphical Plans

## 7.1 Graphical Plans required Guidelines

**Table 7-1** lists the graphical plans have been prepared for the LW W3-W4 Extraction Plan Study Area in accordance with the *Draft Guidelines for the Preparation of Extraction Plans V5 (*DPE, 2015). The A0 size graphical plans are provided in **Volume 5.**

It is noted that given there are no existing or proposed workings in other seams above or below the proposed working seam, Plan 4 is not required.

**Table 7-1 Graphical Plans**

| Plan Number | Plan Title | Plan Reference Number |
|---|---|---|
| Plan 1 | Workings and Dimensions | TCC-2234-1 |
| Plan 2 | Surface Features | TCC-2234-2 |
| Plan 3 | Bulli Seam Geological Data | TCC-2234-3 |
| Plan 4 | Existing and Proposed Workings in Seams Above and/or Below | Not required |
| Plan 5 | Mining Titles and Land Ownership | TCC-2234-5 |
| Plan 6 | Geological Sections | TCC-2234-6 |
| Plan 7 | Subsidence Monitoring | TCC-2234-7 |
| Plan 8 | Aerial Photography | TCC-2234-8 |

# 8 Document Information

## 8.1 References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## 8.2 Related Documents

Related documents directly related to or references from this document are provided below in **Table 8-1**.

**Table 8-1 Related Documents**

| Document Title | Document Number |
|---|---|
| Environmental Management System Framework | TAH-HSEC-00173 |
| Mining Operations Plan 2020-2024 | TAH-HSEC-00026 |
| Document and Record Control | TAH-HSEC-00124 |
| Change Management | TAH-HSEC-00171 |
| Risk Management | TAH-HSEC-00229 |
| WRAC Workplace Risk Assessment and Controls | TAH-HSEC-00014 |
| Health and Safety Management Plan | TAH-HSEC-00189 |
| Emergency Management Plan | TAH-HSEC-00168 |
| Extraction Plan LW W3-W4 Coal Resource Recovery Plan | TAH-HSEC-00327 |
| Extraction Plan LW W3-W4 Water Management Plan | TAH-HSEC-00328 |
| Extraction Plan LW W3-W4 Land Management Plan | TAH-HSEC-00330 |
| Extraction Plan LW W3-W4 Biodiversity Management Plan | TAH-HSEC-00325 |
| Extraction Plan LW W3-W4 Heritage Management Plan | TAH-HSEC-00331 |
| Extraction Plan LW W3-W4 Stonequarry Creek Rockbar Management Plan | TAH-HSEC-00352 |
| Extraction Plan LW W3-W4 Built Features Management Plan | TAH-HSEC-00332 |
| Extraction Plan LW W3-W4 Public Safety Management Plan | TAH-HSEC-00333 |
| Extraction Plan LW W3-W4 Subsidence Monitoring Program | TAH-HSEC-00329 |

## 8.3 Glossary of Terms

Terms references to this document are provided below in **Table 8-2**.

**Table 8-2 Glossary of Terms**

| Term | Definition |
|---|---|
| Adaptive management | Monitoring subsidence impacts and subsidence effects and, based on the results, modifying the mine plan as mining proceeds to ensure that the effects, impacts and/or associated environmental consequences remain within the predicted and designated ranges and in compliance with the conditions of the Project Approval. |
| Angle of draw | The angle of inclination from the vertical of the line connecting the goaf edge of the workings and the limit of subsidence (which is usually taken as 20 mm of subsidence) |
| Aquifer | A sub-surface rock formation containing water in recoverable quantities. |
| Block | A dimensional delineation of the mineral deposit; as in “a block of coal” or a “coal blocked out for extraction”. |
| Built features | Includes any building or work erected or constructed on land, including dwellings and infrastructure such as a formed road, street, path, walk, or driveway; any pipeline, water sewer, telephone, gas or other infrastructure service main. |
| Chain pillar | A block of coal left unmined between the longwall extraction panels. |

| Term | Definition |
|---|---|
| Cliffs | Continuous rockfaces having minimum heights of 10 m, minimum lengths of 20 m and minimum slopes of 2 to 1, i.e. having minimum angles to the horizontal of 63o |
| Closure | The reduction in the horizontal distance between the valley sides. The magnitude of closure, which is typically expressed in the units of mm, is the greatest reduction in distance between any two points on the opposing valley sides. It should be noted that the observed closure movement across a valley is the total movement resulting from various mechanisms, including conventional mining induced movements, valley closure movements, far-field effects, downhill movements and other possible strata mechanisms. |
| Coal face | The current working place for coal extraction. |
| Coal Preparation Plan (CPP) | Processing plant where coal is sized, washed and prepared for the market. |
| Coal seam | Naturally formed underground layer of coal. |
| Continuous miner | The electric powered cutting machine used to remove coal from the active mining face and load it into the shuttle car. |
| Conveyor | The means of transporting coal from the coal face to the underground bin or surface. It consists of a belt being driven by a motor over a roller assembly. |
| Cover depth (H) | The depth of coal seam from the ground surface in m. Cover depth is normally provided as an average over the area of the panel. |
| Critical area | The area of extraction at which the maximum possible subsidence of one point on the surface occurs. |
| Curvature | Second derivative of subsidence, or the rate of change of tilt, and is calculated as the change in tilt between two adjacent sections of the tilt profile divided bythe average length of those sections. Curvature is usually expressed as the inverse of the Radius of Curvature with the units of 1/km (km-1), but the value of curvature can be inverted, if required, to obtain the radius of curvature, which is usually in km. Curvature can be either hogging (i.e. convex) or sagging (e.g. concave). |
| Development | The operations involved in preparing the coal seam for extraction. |
| Downcast | A shaft or other mine opening down to the underground workings in which fresh air from the surface passes. |
| Drift | An inclined access opening from the surface to the coal seam. |
| Exploration | The search for mineral deposits and the work done to prove or establish the extent of a mineral deposit. |
| Extracted seam | The thickness of coal that is extracted. The extracted seam thickness is thickness normally given as an average over the area of the panel. |
| Effective extracted seam thickness (T) | The extracted seam thickness modified to account for the percentage of coal left as pillars within the panel. |
| Face length | The width of the coalface measured across the longwall panel. |
| Far-field movements | The measured horizontal movements at pegs that are located beyond the longwall panel edges and over solid unmined coal areas. Far-field horizontal movements tend to be bodily movements towards the extracted goaf area and are accompanied by very low levels of strain. |
| First workings | The driving of headings (underground roadways) into the solid coal seam prior to the commencement of extraction. First workings do not result in surface subsidence. |
| Gate road | An underground roadway leading to a working place in longwall mining. |
| Goaf | The void created by the extraction of the coal into which the immediate roof layers collapse. |

| Term | Definition |
|---|---|
| Goaf end factor | A factor applied to reduce the predicted incremental subsidence at points lying close to the commencing or finishing ribs of a panel. |
| Headings | An underground roadway formed in the direction of a development panel. |
| Horizontal displacement | The horizontal movement of a point on the surface of the ground as it settles above an extracted panel. Displacement is described by various parameters including horizontal tilt, horizontal curvature, mid-ordinate deviation, angulardistortion and shear index. |
| Incremental subsidence | The difference between the subsidence at a point before and after a panel is mined. It is therefore the additional subsidence at a point resulting from the excavation of a panel. |
| Inflection point | The point on the subsidence profile where the profile changes from a convex curvature to a concave curvature. At this point the strain changes sign andsubsidence is approximately one half of S max. |
| Longwall | A system of mining coal in which the seam is extracted on a broad front or long face using a coal shearer and the roof is supported by hydraulic roof supports. |
| Minor cliffs | Continuous rockfaces having heights between 5 m and 10 m, minimum lengths of 20 m and a minimum slope of 2 to 1. |
| Mitigation measures | Subsidence management measures which aim to reduce subsidence impacts, usually implemented prior to or during mining. |
| Overlap adjustment factor | A factor that defines the ratio between the maximum incremental subsidence of a panel and the maximum incremental subsidence of the panel if it were the first panel in a series. |
| Panel or longwall panel | The plan area of coal extraction, or a block of coal to be mined by longwalls defined by gate roads and coal seam thickness. |
| Panel length (L) | The longitudinal distance along a panel measured in the direction of mining from the commencing rib to the finishing rib. |
| Panel width (Wv) | The transverse distance across a panel, usually equal to the face length plus the widths of the roadways on each side. |
| Panel centre line | An imaginary line drawn down the middle of the panel. |
| Pillar | A block of coal left unmined. |
| Pillar width (Wpl) | The shortest dimension of a pillar measured from the vertical edges of the coal pillar, i.e. from rib to rib. |
| Remediation measures | Subsidence management measures which aim to repair any adverse effects of subsidence, usually implemented after mining. |
| Risk | The chance of something happening that will have an impact on objectives. It is measures in terms of consequence and likelihood. |
| Run of mine (ROM) | Raw coal production; the unprocessed mined coal that is conveyed to the CPP. ROM may consist of coal and rock. |
| Safe, serviceable and Repairable | Safe means no danger to users who are present; serviceable means available for its intended use; repairable means damaged components can be repaired economically. |
| Second workings | Extraction of coal by longwall mining that may result in surface subsidence. |
| Shaft | A vertical opening connecting the surface with the underground workings. |
| Shear deformations | The horizontal displacements that are measured across monitoring lines and these can be described by various parameters including; horizontal tilt,horizontal curvature, mid-ordinate deviation, angular distortion and shearindex. |

| Term | Definition |
|---|---|
| Strain | The change in the horizontal distance between two points divided by the original horizontal distance between the points, i.e. strain is the relative differential displacement of the ground along or across a subsidence monitoring line. Strain is dimensionless and can be expressed as a decimal, a percentage or in parts per notation.<br>Tensile Strains are measured where the distance between two points or survey pegs increases and Compressive Strains where the distance between two points decreases. Whilst mining induced strains are measured along monitoring lines, ground shearing can occur both vertically, and horizontally across the directions of the monitoring lines. |
| Sub-critical area | An area of panel smaller than the critical area. |
| Subsidence | The vertical movement of a point on the surface of the ground as it settles above an extracted panel, but, 'subsidence of the ground' in some references can include both a vertical and horizontal movement component. The vertical component of subsidence is measured by determining the change in surface level of a peg that is fixed in the ground before mining commenced and this vertical subsidence is usually expressed in units of mm. Sometimes the horizontal component of a peg's movement is not measured, but in these cases, the horizontal distances between a particular peg and the adjacent pegs are measured. |
| Subsidence effects | The deformations of the ground mass surrounding a mine, sometimes referred to as 'components' or 'parameters' of mine subsidence induced ground movements, including vertical and horizontal displacements, tilts,curvatures, strains, upsidence and closure. |
| Subsidence impacts | The physical changes or damage to the fabric or structure of the ground, its surface and environmental features, or built structures that are caused by the subsidence effects. These impacts considerations can include tensile and shear cracking of the rock mass, localised buckling of strata, bed separation, rock falls, collapse of overhangs, failure of pillars, failure of pillar floors,dilation, slumping and also include subsidence depressions or troughs. |
| Subsidence consequences | The knock-on results of subsidence impacts, i.e. any change in the amenity or function of a natural feature or built structure that arises from subsidence impacts. Consequence considerations include public safety, loss of flows, reduction in water quality, damage to artwork, flooding, draining of aquifers, the environment, community, land use, loss of profits, surface improvements and infrastructure. Consequences related to environmental features are referred to as environmental consequences. |
| Super-critical area | An area of panel greater than the critical area. |
| Tilt | The change in the slope of the ground as a result of differential subsidence,and is calculated as the change in subsidence between two points divided by the horizontal distance between those points. Tilt is, therefore, the firstderivative of the subsidence profile. Tilt is usually expressed in units of mm/m. A tilt of 1 mm/m is equivalent to a change in grade of 0.1 %, or 1 in 1000. |
| Total subsidence, tilts, curvatures and strains | Accumulated parameters after the completion of each longwall. |
| Travelling subsidence, tilts, curvatures and strains | Transient movements as the longwall extraction face mines directly beneath a given point. |
| Upcast | A shaft or other mine opening through which air returns to the surface after ventilating the underground workings. |
| Uplift | An increase in the level of a point relative to its original position. |

| Term | Definition |
|---|---|
| Upsidence | Upsidence results from the dilation or buckling of near-surface strata at ornear the base of the valley. The term uplift is used for the cases where the ground level is raised above the pre-mining level, i.e. when the upsidence is greater than the subsidence. The magnitude of upsidence, which is typically expressed in the units of mm, is the difference between theobserved subsidence profile within the valley and the conventionalsubsidence profile which would have otherwise been expected in flat terrain. |
| Vertical displacement | Vertical downward movements of the ground surface caused by underground coal mining. |
| Valley related movements | Valley bulging movements are a natural phenomenon, resulting from the formation and ongoing development of the valley. The potential for these natural movements are influenced by the geomorphology of the valley. Valley related movements can be caused by or accelerated by mine subsidence as the result of a number of factors, including the redistribution of horizontal in situ stresses and down slope movements. Valley related movements are normally described by the parameters upsidence, closure, compressive strains and tensile strains. |

## 8.4 Abbreviations

Abbreviations used in this document are provided below in **Table 8-3**.

**Table 8-3 Abbreviations**

| Abbreviation | Definition |
|---|---|
| ACARP | Australian Coal Association Research Program |
| ACHA | Aboriginal Cultural Heritage Assessment |
| AHD | Australian Height Datum |
| AHTR | Aboriginal Heritage Technical Report |
| ARTC | Australian Rail Track Corporation |
| BFMP | Built Features Management Plan |
| BMP | Biodiversity Management Plan |
| Bradcorp | Bradcorp Holdings Pty Ltd |
| CAMP | Corrective Action Management Plan |
| Crown Lands | NSW Department of Planning, Industry and Environment – Crown Lands Division |
| DA | Development Application |
| DC | Development Consent |
| DoP | NSW Department of Planning (former) |
| DPE | NSW Department of Planning and Environment (former)<br>Now known as NSW Department of Planning, Industry and Environment (DPIE) |
| DPIE | NSW Department of Planning, Industry and Environment |
| DPIE Crown Lands | NSW Department of Planning, Industry and Environment – Crown Lands |
| DPIE Water | NSW Department of Planning, Industry and Environment - Water |
| DPI | NSW Department of Primary Industries (part of DT & I) |
| DPI Agriculture | NSW Department of Primary Industries – Agriculture |
| DSC | Dams Safety Committee, Dams Safety NSW |

| Abbreviation | Definition |
|---|---|
| EEC | Endangered Ecological Community |
| EES | NSW Department of Planning, Industry and Environment – Environment, Energy and Science Group |
| EIS | Environmental Impact Statement |
| EMSF | Environmental Management System Framework |
| EPA | NSW Environment Protection Authority |
| EP&A Act | NSW *Environmental Planning and Assessment Act 1979* |
| EPBC Act | Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* |
| EPL | Environment Protection Licence |
| ERG | Tahmoor Coal Environmental Response Group |
| ESU | NSW Trade and Investment, Division of Resources and Energy – Environmental Sustainability Unit |
| Heritage NSW | Heritage NSW |
| HMP | Heritage Management Plan |
| HOF | Height of Fracture borehole |
| IPM | Incremental Profile Method |
| km | Kilometre/s |
| LMP | Land Management Plan |
| LW | Longwall |
| LW W1 | Longwall West 1 |
| LW W1-W2 | Longwalls West 1 to West 2 |
| LW W2 | Longwall West 2 |
| LW W3 | Longwall West 3 |
| LW W3-W4 | Longwalls West 3 to West 4 |
| LW W4 | Longwall West 4 |
| m | Metre/s |
| MEG | Department of Regional NSW – Mining Exploration and Geoscience |
| MG | Main Gate |
| mm | Millimetre |
| ML | Mining Lease |
| MOP | Mining Operations Plan 2020-2024 (TAH-HSEC-00026) |
| MSEC | Mine Subsidence Engineering Consultants |
| MSR | Main Southern Railway |
| NPWS | NSW National Parks and Wildlife Service (former) |
| NRAR | NSW Industry – Land & Water – Natural Resources Access Regulator – East |
| NSW | New South Wales |
| OEH | NSW Office of Environment and Heritage<br>Now known as DPIE – Environment, Energy and Science (EES) Group |
| PMLL | Picton-Mittagong Loop Line |
| PSMP | LW W3-W4 Public Safety Management Plan |
| NRSR | NSW Office of the National Rail Safety Regulator |

| Abbreviation | Definition |
|---|---|
| QA/QC | Quality assurance and control |
| RAPs | Registered Aboriginal Parties |
| Resources Regulator | Department of Regional NSW – Resources Regulator |
| Roads and Maritime | NSW Roads and Maritime Service |
| ROM | Run of Mine |
| RRG | Rail Response Group |
| SA NSW | Subsidence Advisory NSW (formerly the Mine Subsidence Board) |
| SCRMP | Stonequarry Creek Rockbar Management Plan |
| SES | NSW State Emergency Services |
| SIMEC | SIMEC Mining Division |
| SMP Application | 2014 Subsidence Management Plan Application |
| Spatial Services | NSW Department of Finance, Services and Innovation – Spatial Services |
| SRG | Structural Response Group |
| Tahmoor Mine | Tahmoor Coal Mine |
| Tahmoor Coal | Tahmoor Coal Pty Ltd |
| TARP | Trigger Action Response Plan |
| TCCCC | Tahmoor Colliery Community Consultative Committee |
| Tesrol | Tesrol Clearview Pty Ltd |
| TfNSW | Transport for NSW |
| TG | Tailgate |
| UDEC | Universal Distinct Element Code |
| Western Domain | The area to the north-west of the Main Southern Rail within ML 1376 and ML 1539 |
| WHS Act | *Work Health and Safety Act 2011* |
| WHS Regulation | *Work Health and Safety Regulation 2017* |
| WHSMP Act | *Work Health and Safety (Mines and Petroleum Sites) Act 2013* |
| WHSMP Regulation | *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* |
| WLEP | *Wollondilly Local Environment Plan 2011* |
| WMP | Water Management Plan |
| WSC | Wollondilly Shire Council |

## 8.5 Change Information

**Table 8-4** provides the details of document history of this Extraction Plan.

**Table 8-4 Document History**

| Version | Date Reviewed | Reviewed By | Change Summary |
|---|---|---|---|
| 1.0 | May 2021 | Zina Ainsworth, David Talbert, Malcolm Waterfall | New document |
| 2.0 | August 2021 | Zina Ainsworth, David Talbert, Malcolm Waterfall | Updated subsidence analysis and inclusion of SCRMP |

## 8.6 Document Distribution

This Extraction Plan and associated document have been distributed according to **Table 8-5**.

**Table 8-5 Distribution List for Extraction Plan**

| Agency | Contact Person | Position | Email Address / Portal |
|---|---|---|---|
| DPIE - Resource Assessments | (Planning Portal) | (Planning Portal) | (https://www.planningportal.nsw.gov.au/major-projects) |
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| DPIE - Crown Lands Division | Chris Reynolds | Executive Director | cl.enquiries@crownland.nsw.gov.au |
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| Department of Regional NSW - MEG | (General email) | (General email) | Resource.operations@planning.nsw.gov.au |
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