APPENDIX B POST CLOSURE RISK MANAGEMENT PLAN

1. Introduction

1.1 Rehabilitation Project Summary

ENGIE Hazelwood is rehabilitating the site of the former Hazelwood Mine and Power Station to deliver a safe, stable, sustainable and non-polluting site that enables productive future uses. The Hazelwood Rehabilitation Project (HRP) involves the decommissioning of remaining buildings, roads and infrastructure, earthworks to reprofile steep mine slopes, reinstating water courses to a more natural alignment and the proposed establishment over time of a pit lake within the disused mine void.

A pit lake to RL+45m AHD would assist the site to achieve a safe and stable landform in the long term as well as provide significant economic, recreational and possible flood mitigation benefits to local communities and the region.

As part of the HRP, a Declared Mine Rehabilitation Plan (DMRP) will be submitted to the Department of Energy, Environment and Climate Change (DEECA) along with the Mine Land Rehabilitation Authority (MLRA), outlining the measures and actions that ENGIE Hazelwood will undertake to rehabilitate the land impacted by mining within the mining licence boundary.

A Post Closure Risk Management Plan (PCRMP) (this document) is required under legislation and has been developed as part of the DMRP submission.

1.2 Purpose

The PCRMP aims to identify and assess the rehabilitation related risks, identify control measures or actions to mitigate the risks and demonstrate the decrease in risk profile across the rehabilitation phases for area within Mining Licence MIN5004. The plan can be provided to future land managers for implementation of monitoring and maintenance controls after relinquishment of the land contained within the mining licence.

The plan will include a register of all risk events and/or hazards relevant to the post closure (post relinquishment) phase of the project.

The purpose of the PCRMP is to meet the requirements set out in the MRSD Act and MRSD Regulations. Specifically:

- Mineral Resources Sustainable Development (MRSD) Act s. 84AZU(3)(c) requires that the DMRP must include a post-closure plan setting out the monitoring and maintenance to be carried out on the closure of the mine on the declared mine land.

- MRSD Regulations r. 64D requires a post-closure plan to contain:
    - Ongoing monitoring and maintenance activities required to maintain the declared mine land in a safe and stable state after closure,
    - A risk management plan for the mitigation of risks that may continue post-closure,
    - The plant that the declared mine licensee proposes to use to meet the closure criteria and to lease on the declared mine land that will become property of the Crown under section 114 of the Act,
    - Nominate who is responsible for post-closure monitoring and maintenance activities,
    - The time and manner in which ongoing monitoring and maintenance activities will be carried out after closure,
- MRSD Regulations r. 64F(2)(e) requires a risk management plan that specifies the actions the licensee will take to mitigate, as far as reasonably practicable, identified risks including:
    - The performance standards to be achieved by either individual measures or a combination of measures,
    - The management systems, practices and procedures the licensee will apply to monitor and manage risks and to comply with performance standards.

These requirements are met within this PCRMP, and the Post Closure Monitoring & Maintenance Plan in Appendix C, with further details to be developed as further revisions of this plan are made throughout the rehabilitation project and the understanding of post closure risks are better understood by the declared mine licensee.

1.3 Background

Following the Hazelwood Mine Fire Inquiry and the Latrobe Valley Mine Fire Risk Assessment in May 2015, an amendment was made to Mining Licence MIN5004, to include a condition to create and maintain a site-based risk assessment that considered four key risk categories and the associated possible impacts on public receptors. These risk categories were fire, environmental, security and emergency response. The risk assessment conducted in 2015, contributed to a Risk Assessment Management Plan (RAMP), which then informed the RAMP 2017 and subsequent RAMP 2019 submission, which was applicable to the implementation of the then-proposed Mine Rehabilitation and Closure Plan – Stage 1, Mine Fill Commencement.

Due to the extensive work undertaken on the 2015 and 2017 RAMPs and the breadth of closure related subject matter expert technical direction provided in the RAMP 2019, the RAMP 2019 has been utilised as a starting reference and further refined to develop this PCRMP. The PCRMP considers all three closure phases on the project – Phase 1- Active Rehabilitation, Phase 2- Passive Rehabilitation and Phase 3- Post Closure.

1.3.1 Review and Update

The PCRMP is intended to be reviewed and updated when one of the below conditions are met:

- Every 2 years during the development of the Rehabilitation Project
- At the commencement of each closure phase (refer to Section 2.2 for more details on what the phases are)
- When there is a major change in the rehabilitation activities impacting the risk profile

1.4 Relevant Documentation

There have been a number of other risk assessments and documents which have been used as references to provide the necessary background and detail to inform this PCRMP. Table 1 shows the list of relevant documentation that should be read in conjunction with this PCRMP.

Table 1 Relevant Documentation

No.	Title	Date
1	Environmental Management System (EMS)	April 2009
2	Ground Control Management Plan (GCMP)	July 2023
3	Fire Risk Management Plan (FRMP)	January 2023
4	Hazelwood DMRP Sensitive Receptors	July 2024
5	Environmental Effects Statement Risk Register	September 2024
6	Hazelwood Risk Management Plan (RMP)	December 2019
7	Landfill Environmental Monitoring Plan	December 2024

2. Rehabilitation Objectives and Phases

2.1 Rehabilitation Objectives

The key objective of the rehabilitation project is that the end landform will be safe, stable, sustainable and non-polluting, with as far as practical, minimal ongoing monitoring and maintenance requirements. A tiered risk assessment approach was adopted for the DMRP risk assessment development, and it is assessed against the rehabilitation objectives defined in *DMRP Chapter 9 Rehabilitation Objectives*.

2.2 Closure Phases

The PCRMP is developed covering activities across the three closure phases, namely- Phase 1 Active Rehabilitation (includes lake filling), Phase 2 Passive Rehabilitation (post fill) and Phase 3 Post Closure.

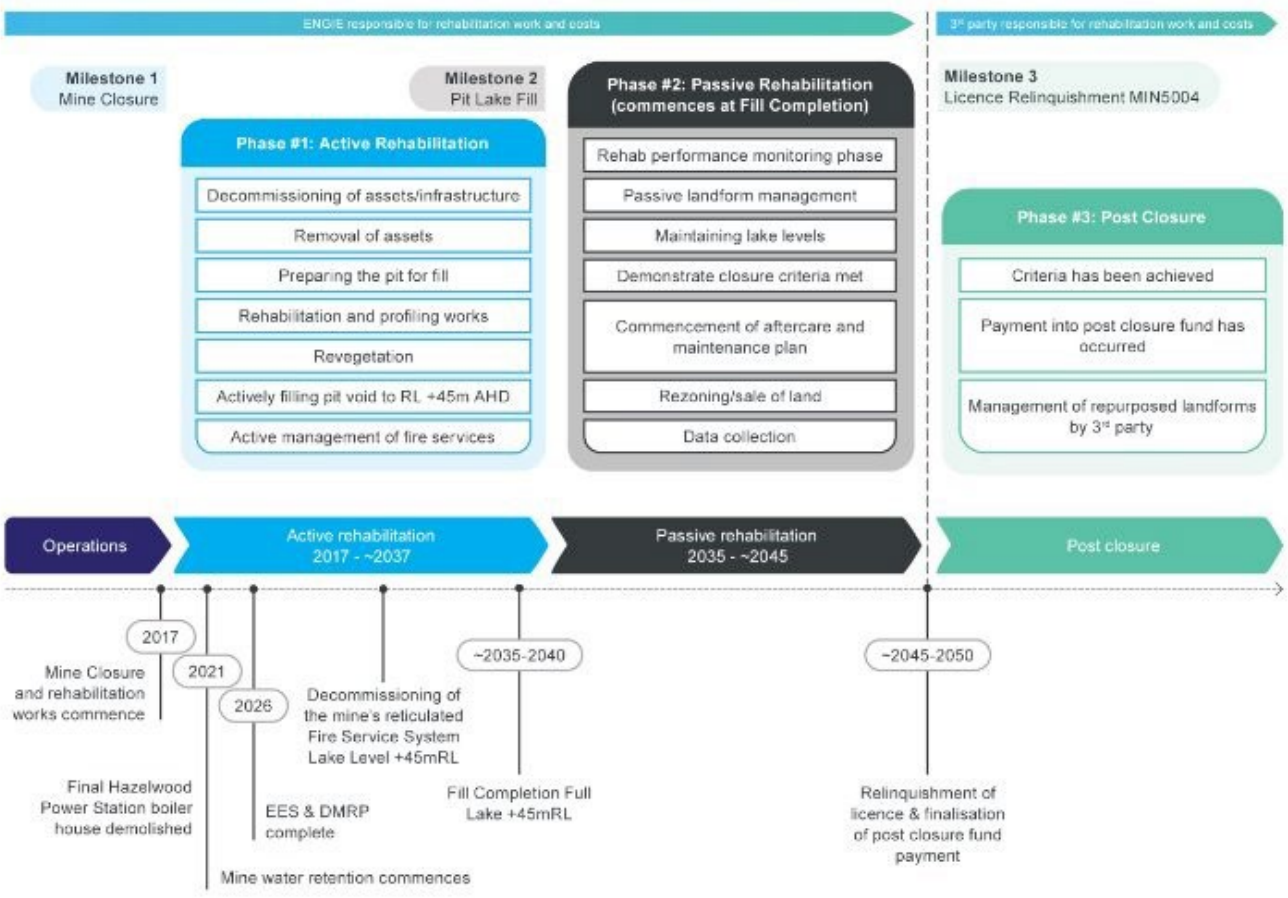

Figure 1 Closure Phases

Final execution of rehabilitation and relinquishment of the Hazelwood site, as described in the DMRP, will occur in three primary phases.

- Phase 1: Active rehabilitation
  - Decommissioning of assets/infrastructure (mostly complete)
  - Removal of assets (mostly complete)
  - Preparing the pit for fill (mostly complete)
  - Rehabilitation and profiling earth works (underway)
  - Revegetation (well underway)
  - Actively filling pit void to RL +45m AHD
  - Active management of fire services (ongoing)
- Phase 2: Passive management
  - Rehabilitation performance monitoring
  - Passive landform management

- Maintaining lake levels
- Demonstrate closure criteria are met
- Rezoning/sale of land
- Data collection

– Phase 3: Post closure
  - Closure criteria have been achieved
  - Payment into Declared Mine Fund has occurred
  - Commencement of monitoring and maintenance activities
  - Management of repurposed landforms by third party
  - Relinquishment of MIN5004

2.3 Project Domains Summary

ENGIE Hazelwood is currently undertaking an Environment Effects Statement (EES). The EES aims to consider environmental risks posed by the proposed rehabilitation of the Hazelwood project site. As the Hazelwood site is over 5000Ha in size and consists of a number of unique landforms, the site was divided into a number of 'domains' and 'sub-domains'. The domains are typically large, such as the 'Mine Void' (approx. 1200 Ha) or 'the Hazelwood Cooling Pond' (approx. 300 Ha). The sub domains are smaller areas contained in the domains and contain similar structures, attributes and utilise similar rehabilitation principles. For the PCRMP, the domains are consistent with those proposed within the EES. The closure domains are referred to in the DMRP risk assessment process are listed below in Table 2.

Table 2 Domains & Sub-Domains

EES Domains		Sub-Domains		
No.	Title	No.	Closure Domain	Description
1	Mine void	1	Mine void lake	Mine void area filled with water at any particular stage of rehabilitation, progressing to a final level (currently estimated as RL +45 m AHD).
		2	Mine batters and floor	All mine void batters from mine floor surface to the upper edge / crest of mine void batter walls including the area immediately adjacent to the crest. Inclusive of a shoreline zone around the perimeter of the mine void where the final pit lake level (currently estimated as RL +45 m AHD) will interact with the batter surfaces.
		4	Landfills and disposal areas	Ash storage area (HARA).
		6	Infrastructure	Infrastructure systems and / or facilities. Systems for mitigating risk and facilitating safe operations and access.
2	Hazelwood Cooling Pond*	5	Watercourses, storages and diversion structures	Water storage, outlet structure and associated embankments
		6	Infrastructure	Storage and transfer pumps for fire fighting reserve
3	Mine surrounds	3	External overburden dumps	Landforms constructed from overburden material that are located external to the mine void area.

EES Domains		Sub-Domains		
		4	Landfills and disposal areas	Ash storage areas, waste dumps and asbestos landfill sites, regulated by associated EPA licences.
		5	Watercourses, storages and diversion structures	Water management ponds such as the WEP, NORP etc that have an interim operational function Water storages (operating dams) HCP, Recirc Pond, Clarification Pond etc (Either operational or in decommissioning phase) Water structure for diverting or channelling water such as MMD, EHC levee, MRFD, MRD levee.
		6	Infrastructure	Infrastructure systems and / or facilities To service interim operations and rehabilitation activities • Fire and water • Depressurisation • Electrical • Buildings security and comms • Roads, access, hardstands
		7	Remaining land incl. conservation areas	Peripheral land generally outside the operational area, may have minimal disturbance or previously rehabilitated, Including leased land within MIN5004 area plus all land offsets and conservation areas under ENGIE Hazelwood's management.
4	Streams and Waterways	5	Watercourses, storages and diversion structures	Engineered diversion and associated embankments / levee structures that divert water flows
		7	Remaining land incl. conservation areas	Land containing and adjacent to streams and water courses attributed to the maintenance of the stream (bank, flood plain and riparian zones)
		8	Waterways	Natural water courses and diversions with reserves (usually formally recognised and draining a surface catchment)
5	All	-	-	-

3. Risk Methodology

3.1 Risk Identification

This PCRMP presents the risks that have been identified during the DMRP generation process along with those risks which are relevant from the EES. The risks include those raised by ENGIE, technical discipline subject matter specialists and other key stakeholders. This wide variety of personnel is necessary as the technical risks have the potential to impact the environment, any member of the public or land, property and infrastructure.

A Source Pathway Receptor (SPR) model has been used to tabulate and assess the risks in the DMRP Risk Register. This model has previously been used by ENGIE in the development of the WPV 2019 and the RCP 2019. The model allowed for credible linkages of 'risk sources to receptors' to be identified. The SPR analysis captured factors that have the potential to impact the site, external receptors and may result in non-conformance to the stated closure objectives.

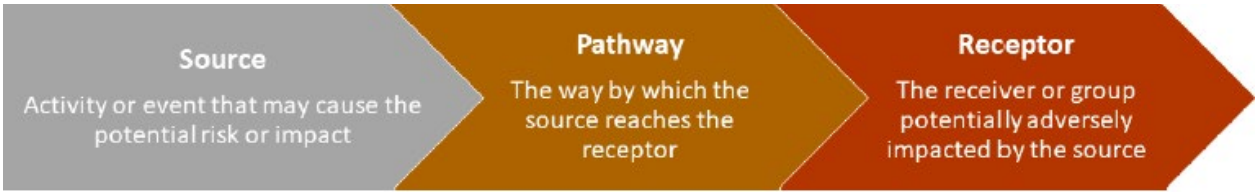

Figure 2 SPR Critical Elements and Linkages

Each individual risk source was assessed, with each having the potential to have more than one pathway leading to more than one receptor. Each risk source was reviewed for applicability against each of the phases to replace the typical 'point-in-time' assessment completed on risks where 'inherent', 'current' and 'residual' language is used.

Risks were grouped into four risk categories:

- Fire
- Geotechnical
- Environmental
- Security

Each risk was identified from either the references listed in Table 1 or via a series of workshops. The first tranche of workshops were conducted in May 2024 which reviewed the initial identification of risks:

- Day 1: Water quality, dams & water retaining structures, contamination
- Day 2: Coal fire, vegetation fire, ground / batter stability, erosion
- Day 3: Environment

Beyond these workshops the Risk Register was updated to include details from the Bowties completed by ENGIE in 2019. These updates importantly drew upon ENGIE's network of Critical Controls and accompanying Performance Standards, currently employed as risk control measures for several of the major risk areas within the mine and it's surrounds. The risks from the first set of workshops were also reviewed and separated into single source events to ensure an appropriate level of scrutiny and risk delineation.

The second tranche of workshops were conducted in July and August 2024 and were aimed at reviewing the updated Risk Register. The workshop days looked at:

- Day 1: Geotechnical risks
- Day 2: Fire and Security risks
- Day 3 and 4: Environmental risks

This was the final set of workshops held in order to develop the DMRP Risk Register with a much broader group involving professionals from GHD, ENGIE, MLRA, CMQ and WSP. The objectives were to:

- Validate the listed controls
- Identify the necessary performance standards required for post relinquishment
- Ensure the level of detail in the Risk Register is applicable for the DMRP submission
- Last opportunity to identify any missing risks

3.2 Risk Assessment

The risk assessment was structured to monitor the evolution of risks and provide suitable and practical control mechanisms across the three specific closure time horizons or phases – 'active' and 'passive' rehabilitation phases, post closure and mining licence relinquishment. The associated Risk Assessment was then conducted at the end of each of these phases, once all the controls associated for the phase were employed and effective. Maximum 'credible' consequence outcomes were determined when considering the associated consequence category and then the likelihood of that consequence occurring was agreed between the team members. Consequences were considered against those sensitive receptors (refer to Section 3.3 for further information).

There were a number of risks which triggered more than one consequence category and in this case the assessment team members selected the highest consequence outcome category to inform the assessment, with references to all potential outcomes documented in the 'potential consequence description' column of the Risk Assessment.

The EES risk criteria were adopted for the risk assessment process which are a modified version of the ERR risk criteria. The main changes to the ERR consequence criteria were:

- Vibration impacts under 'public amenity'
- Noise impacts under 'public amenity'
- Change in environmental values under 'surface water or groundwater'
- Water extraction and diversion of surface water under 'surface water or groundwater'

The consequence criteria, likelihood criteria and risk matrix adopted are presented in Appendix A.

The Risk Register also included 'risk ranking assumptions' which provided an opportunity for the team members to document the reasoning, logic and any relevant input assumptions used in the assessment process. This was facilitated to ensure a high level on transparency for future readers of the assessment, enabling easier 'in-progress' reviews and to assist external stakeholders to understand the Risk Register as the Rehabilitation Project progresses through each of the closure time horizons.

The Risk Register includes the receptors, controls, monitoring and performance measures, along with an agreed team assessment on whether each risk, after control implementation, or during the rehabilitation phases has been reduced to a 'as far as reasonably practicable' level.

Please refer to the Risk Register in Appendix B for full details.

3.3 Sensitive Receptors

Sensitive receptors for this rehabilitation project are defined as those within 2 km of the mine crest, that could potentially be impacted by the rehabilitation works / risks, based on the buffers published by the EPA. Within this range, a list of sensitive receptors has been identified, as shown in Appendix I.

4. Risk Summary

The risk ranking of the majority of the risks generally decreases as they progress through the varying time horizon phases, from active rehabilitation through to passive rehabilitation, post closure and then relinquishment. However, for some risks, the risk remains the same throughout the phases as they either typically remain a medium or high risk during all three phases, irrespective of controls or they cannot physically be reduced any further on the risk matrix beyond low.

Some risks were not able to be assessed during the passive rehabilitation or post closure phases due to a number of planned infrastructure changes (such as the removal of the Morwell Main Drain) and the risk is no longer relevant for future phases, or the mine void has been filled with water to RL+45m AHD and therefore the risk is no longer deemed credible.

Risks identified and assessed for Fire, Security, Geotechnical and Environment are summarised in Table 3. This shows the number of risks and how they have been risk ranked, across each of the phases.

Table 3 Risk Analysis Summary - Individual Risk Rating Totals

	Active Rehabilitation	Passive Rehabilitation	Post Closure
Low	22	35	31
Medium	14	5	5
High	8	3	3
Very High	0	0	0
Risk Eliminated	0	3	6
Not Assessed	2	0	1
Total Risks Ranked	44	43	39

Generally, the risk profile for impacts associated with a member of public, environment and land, property & infrastructure, is relatively low. There are no risks that rank as a Very High risk. With all the proactive rehabilitation activities and supporting controls occurring during the Rehabilitation Project, risks during post closure are planned to be eliminated or mitigated to a low level. Of the 39 risks which remain post closure, only 12% of risks were assessed as Medium and 7% assessed as High.

4.1 Fire

Fire is a well-known risk in the Latrobe Valley mining industry, with previous significant fires having impacted upon the sector (including the Hazelwood Mine Fire in 2014, which led to the subsequent Hazelwood Mine Fire Inquiry processes between 2014 to 2015).

The management of mine fire risk is therefore a key consideration in the context of rehabilitating the Hazelwood Mine, which has informed ENGIE Hazelwood's preferred rehabilitation option (i.e. a full pit lake landform). Therefore, the fire risk assessment conducted for the purposes of the DMRP was informed by:

- ENGIE Hazelwood's current fire protection and fire risk mitigation arrangements (including under the FRMP 2023). These arrangements reflect various operational improvements in relation to fire risk

mitigation that were implemented at the Hazelwood site in accordance with the recommendations and affirmations from the HMFI processes, such as:

  - Amendments to emergency response plans to require an increased state of readiness on Total Fire Ban days and the pre-establishment of an Emergency Command Centre under certain high-risk fire conditions
  - Development of minimum manning levels for different fire risk conditions
  - Other compliance arrangements implemented in response to significant legislative and regulatory reforms, such as the introduction of Fire Risk Management Plan requirements for coal mines under Schedule 8 of the MRSD Regulations

- The expectation that mine fire risks will gradually decrease over the course of filling the Hazelwood Mine, including where a full pit lake landform is expected to passively manage these risks through the coverage of exposed coal within the mine in the long-term.

Five risks relating to fire were identified through the process, including a segregation of 'fire' risk into those risks which may present from a coal fire or vegetation fire with key differences being how these risks may materialise under varying circumstances (i.e. spot fires versus a running fire).

The highest risk assessed for the active rehabilitation phase was a coal fire initiated by external ember attack (Risk ID#2). The agreed key outcome impact associated with all the fire risk scenarios was the impact to visual amenity given the likelihood of large amounts of coal burning smoke which would be generated. It was not perceived that the safety of the community would be under threat and was subsequently ranked low. Any possible community safety considerations were deemed to be highly unlikely due to the proximity of the community to the remaining exposed coal areas and that the site maintained a significant site security presence whilst active rehabilitation was taking place.

As the mine transitions to passive rehabilitation, post closure and relinquishment phases, all coal is covered by clay, topsoiled and sow to grass or are submerged by the mine lake at RL +45m AHD, resulting in the highest risk event being a vegetation fire (Risk ID#3).

This is primarily driven by an increase in people in the area (the site is envisaged to have public access) and therefore the potential for fires started by members of the community increases whilst the receptor potential also increases, as more members of the public may be exposed. Discussions were had between the team members which highlighted additional control possibilities, such as the consideration to restrict access on a fire danger day to assist with mitigating this risk during post closure. The details on exactly which entity would be responsible for implementing this action for the post closure and relinquishment periods is not known at this time, however it is suggested that this becomes an action to be completed either by the Local Council or the Mine Land Rehabilitation Authority.

The breakdown of the fire Risk Assessment is summarised in Figure 3 below.

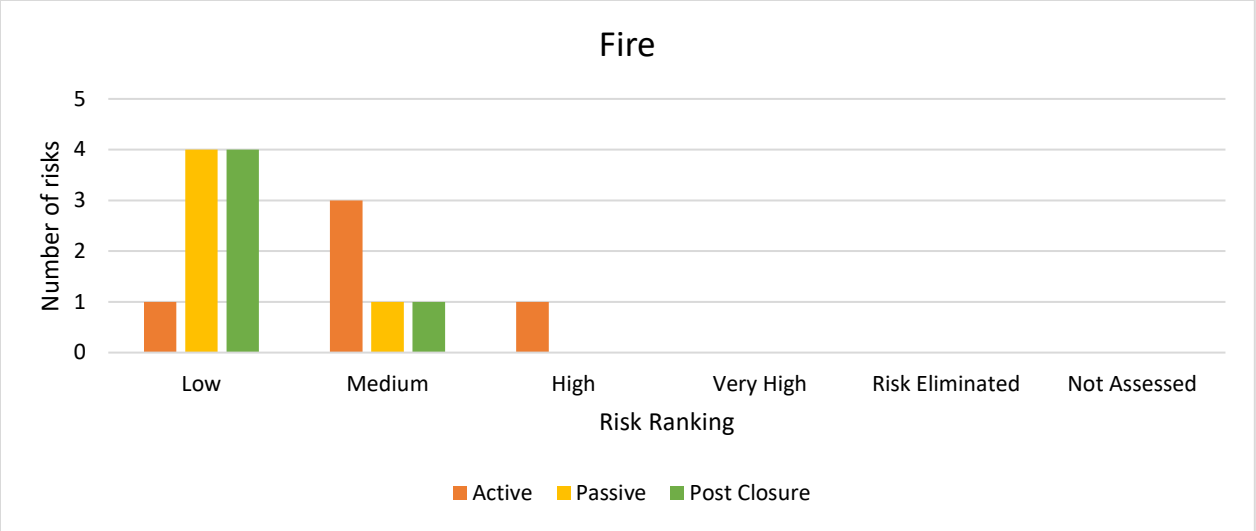

Figure 3 Risk Analysis Summary - Fire

4.2 Ground Stability

A total of ten Geotechnical risks were identified by the team, including risk events associated with geotechnical instability, erosion, Hazelwood Ash Retaining Embankment (HARE) failure, infiltration of water through the Morwell Main Drain (MMD), differential ground movement and floor heave.

The highest rating risks for the geotechnical discipline were those associated with:

- Geotechnical instability of in-situ overburden and/or coal due to extreme seismic event (Risk ID#9)
- Elevated groundwater levels (Risk ID#10), or infiltration of water through the MMD (Risk ID#16)
- Uncontrolled floor heave due to loss of weight balance (Risk ID#18)

Once the final rehabilitated landform is achieved, a mine lake level of RL+45m AHD, and ground movement monitoring has confirmed that landform stability during the passive rehabilitation phase is minimal, akin to non-consequential or background movement, the highest risk during the post closure period is for unplanned or differential ground movement associated with aquifer 're'-pressurisation (Risk ID #17).

The team members did discuss a period, immediate post the achievement of a RL+45m AHD mine lake, where the M1 and M2 aquifer pumps used for filling of the mine void are turned off. In this period there is an expectation that some ground movement will occur within the mining licence area. However, this increase in risk did not warrant an increase or a change in the consequence rating of Moderate or the likelihood rating of Rare. For ground movement beyond the mining licence area, in particular within the Morwell Township, differential movement may be expected as aquifers repressurise, however the potential damage is expected to be 'within societal norms', be indistinguishable to movements caused by foundations in reactive clays which shrink and swell alongside seasonal fluctuations and be within the movement tolerances of those structures. This is explained further in the WSP detailed technical reports supporting the EES.

The other high risk during post closure is 'Uncontrolled floor heave due to loss of weight balance (Risk ID#18)'. The consequence to the environment is Moderate during the active rehabilitation phase as aquifer draw down or pumping is continuing. It is expected that any potential heave during this period would be more localised and contained within the mine void. However, as the aquifer repressurises during the passive and post closure periods, with the aquifer pump network turned off, the aquifers will repressurise, acting to increase uplift pressures exerted on the floor of the mine. It is expected from the detailed work completed as part of the EES, that full aquifer recovery and pressures will occur at some point approximately 200 years into the future, as a result, the post closure risk is rated as a High albeit with an accompanying likelihood of Rare.

The breakdown of the risk analysis is shown in Figure 4 below.

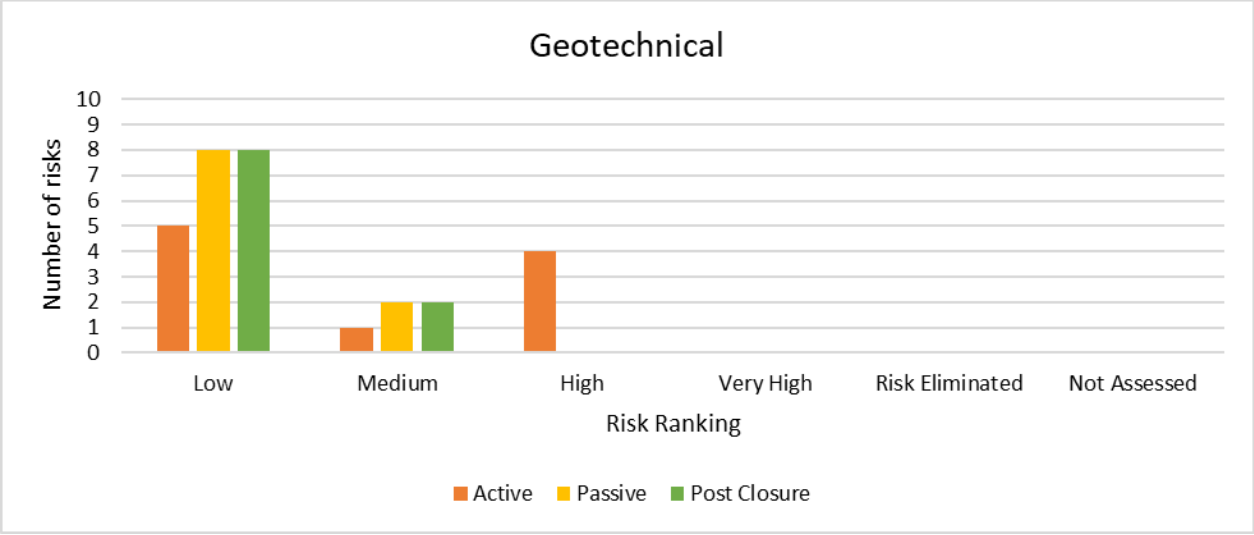

Figure 4 Risk Analysis Summary - Geotechnical

4.3 Environmental

The highest number of risks are associated with Environment category, with a total of 28 risks identified.

The highest ranked environment risk during active rehabilitation is associated with EPA Licensed landfills, contamination and seepage (Risk ID#19). This is driven by the consequences rating of Critical, as potential leachate can cause deleterious impacts to members of the community who may come into contact with it in close proximity of the landfills. However, the workshop team members all believed that the likelihood of such an event occurring is Rare. It was agreed that this risk rating would not change even with the implementation of the slated controls acting to restrict access around the landfill and the installation of appropriate landfill capping in accordance with the EPA license requirements. This was agreed as the landfill itself cannot be eliminated from the mine surrounds and therefore the consequence cannot be modified. With the likelihood already as low as possible, this risk was considered by the team members as being reduced So Far As Is Reasonably Practicable (SFAIRP).

During the post closure period, 64% of the risks identified are rated as 'Low' as they are inherently low risk to the community, environment and infrastructure. Over the whole Rehabilitation Project 21% of risks were able to be eliminated, please refer to Section 4.5 for more information on the eliminated risks. Whilst the majority of risks fall into the Environmental Category, through ENGIE's adopted rehabilitation strategy and accompanying controls, the majority of risks reduce to being Low.

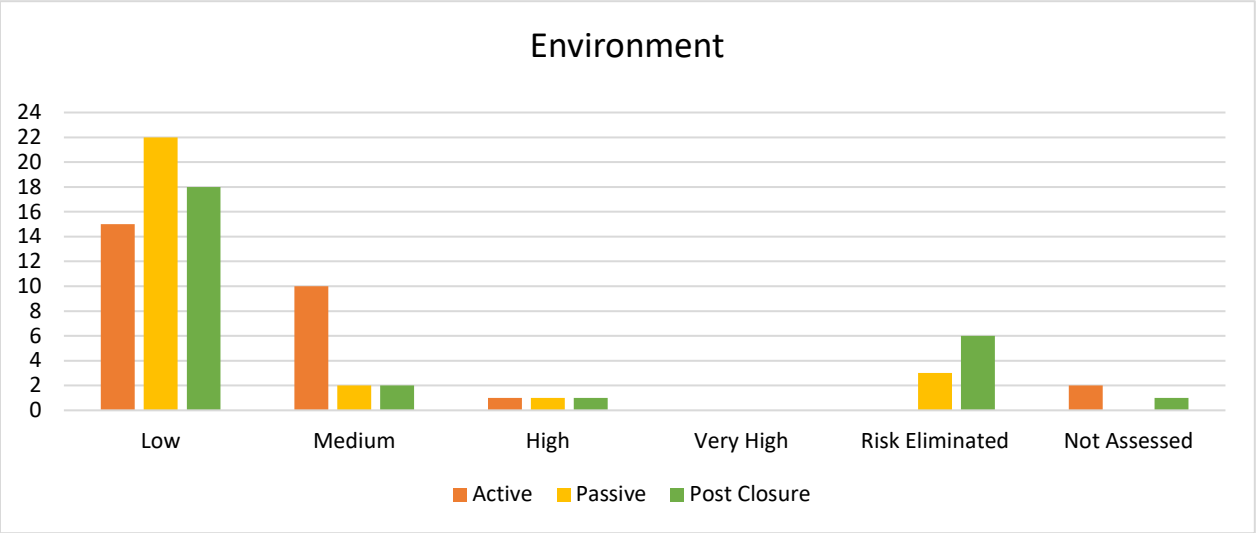

Figure 5 Risk Analysis Summary - Environment

4.4 Security

Three risks were identified relating to Security, which included risk events associated with unauthorised, authorised access and malicious acts.

The highest risk assessed was that associated with a member of the public accessing the site, unauthorised (Risk ID#6) or authorised access (Risk ID#7) to the mine crest. Both risk events were ranked as High for Active Rehabilitation, Passive Rehabilitation and Post Closure periods. The reason for such a high ranking is that for both scenarios a potential fatality outcome of a member of the public was believed, by the workshop team members, to be credible (either due to drowning, falling down steep batters during rehabilitation works or interacting with rehabilitations activities during construction). The likelihood was assessed as Rare for all phases however it was noted that as the timeframe progresses, the final landform will become safer (i.e. a reduction / lowering of coal batter profiles and no large operating or rehabilitation equipment will be present) and therefore can be assessed as SFAIRP when compared to the risks associated with any other public water body, dam or landscape.

The breakdown of the risk analysis is shown in Figure 6 below.

Figure 6 Risk Analysis Summary - Security

4.5 Eliminated Risks

Of the risks assessed, six risks were eliminated during passive rehabilitation or post closure phases. These risks have been summarised below with an explanation provided on why they were eliminated. Note that these risks all fall in the category of Environment.

Table 4 Eliminated risks

Risk	Phase of risk was eliminated	Explanation
Acid Sulphate Soils (ASS) resulting from 1) Exposure of ASS during construction, 2) Inundation and mobilisation of ASS during water table recovery	Passive Rehabilitation	In the passive rehabilitation phase, it is anticipated that all rehabilitation works have been completed and no further excavation activities will occur. As such, the risk of exposure to acid sulphate soils is eliminated.
Generation of noise & vibration from rehabilitation works	Post Closure	There are no rehabilitation or major maintenance activities that could result in offsite noise and vibration impact during the post closure phase, therefore the risk is eliminated. This is in line with the findings from the EES Noise & Vibration Technical Assessment.
Visual amenity impacts from rehabilitation works (e.g. light, visual)	Post Closure	This risk is eliminated during post closure phase as the visual landscape of the rehabilitated land will form part of the final landform which will blend into the surrounding lands.

Risk	Phase of risk was eliminated	Explanation
Greenhouse gas generated on site	Post Closure	During post closure there will be no need for greenhouse gas emitting equipment. As such, the risk is eliminated.
Water quality degrades in the pit lake due to geochemical reactions within pit such as acid generation, leaching of contaminants from HARA	Passive Rehabilitation	In the passive rehabilitation phase, all coal is either submerged and/or capped. As such, the interaction with coal has ceased and therefore risk is eliminated in the passive rehabilitation phase.
Rehabilitation activities adversely affect known / unknown historic heritage values	Passive Rehabilitation	There are no earthworks present in the passive rehabilitation phase and all identified historical heritage sites will have been identified and removed during the active rehabilitation phase. As such, this risk is eliminated.

5. Risk Mitigation

Risk mitigation is the process by which a varying range of active or passive controls can be implemented to reduce the likelihood of a risk occurring and if it does occur, act to mitigate its outcome consequence. A range of possible controls are available, with a number of these discussed in the following sections.

5.1 Controls for Mitigation

Several risk controls for the active and passive rehabilitation phases, post closure and mining licence relinquishment were identified during each of the workshops, noting that for a number of the risks, extensive controls have been described in a range of supporting documents. This includes both critical and non-critical / control measures. As the team deliberated on the Risk Register during the workshops, where controls existed, these were reviewed and where controls were missing or new risks that were not previously considered, additional controls were identified by the team as potential controls including controls for the time horizons of post closure and mine relinquishment.

The controls were categorised into the following types of controls:

- Engineering controls – these are controls which do not require significant human intervention and in most cases are already in place (e.g. design, system, object)
- Administration controls – these are controls which rely on human intervention to enact, maintain or monitor the control's performance (e.g. Maintenance, emergency response, monitoring)
- Supporting documents – these are the documents which outline where the controls are documented (e.g. TARPs, Procedures, Management Plans)

The number of controls gradually decreased across each of the phases, demonstrating that less active intervention was required to manage risks in the long term, or that the decomposition of risks was positive, i.e. a clear reduction or complete removal, so that the need for control application was no longer warranted.

Some of the controls identified had the potential to significantly reduce the impact of risks across all three phases. These controls were typically engineering controls in design that had the ability to reduce multiple

risks, reducing the outcome risk rankings across the sequential phases. These controls are summarised in the table below.

Table 5 Controls that significantly mitigated impacts of risks

Control Name	Risk ID's it was used to mitigate	Explanation
Capping exposed coal	1, 2, 3, 4, 5, 14, 23, 37	The design, maintenance and provision of capped coal mitigates the potential for coal fire events
Aftercare inspection of capping	1, 2	The maintenance and inspection of coal capping is key to mitigating the potential for coal fire events
Maintaining mine void with water to RL +45m within an acceptable range according to the design criteria	1, 2, 3, 4, 5, 9, 10, 17, 33, 34, 35	Maintaining the mine void with water mitigates instability issues with the betters in the void, it mitigates fire risk as the water submerges exposed coal
Final landform design (e.g. batters, bench levels, pit lake, revegetation of batters)	6, 7, 10, 11, 12, 13, 14, 15, 17, 20, 23, 25, 29, 37, 40	The overall design of the final landform mitigates risks associated with visual amenity, environment and safety. This is because it will be designed in a way that does not impose any more of a risk or impact compared to other public water bodies.
Floating booms and other wave mitigation controls	12, 15	The wave mitigation controls assist with mitigating erosion impacts, concentration of contaminants (e.g. ash)
Aquifer depressurisation	17, 18, 34	Aquifer depressurisation will assist with unplanned or differential ground movement, uncontrolled floor heave
Fencing and controlled access	5, 6, 7, 8, 14, 19, 29, 31, 32, 41	Fencing and controls will change across the three phases, but this control mitigates risks associated with the safety impact of the community, preventing unwanted access and control of animals and livestock.
Water quality monitoring	29, 30, 31. 32, 33, 34, 35, 36	Monitoring of water quality as per sampling regime will assist with managing water quality and potential contaminations

With these controls in place, along with all the other denoted controls for each of the risks, the associated impacts are reduced to a level of 'so far as is reasonably practicable', noting that there is a separate section to describe the specific controls needed to mitigate risks specifically during the final phase, please refer to Section 5.2 on Critical Controls Selection.

5.2 Critical Control Selection

In addition to standard controls, Critical Controls have also been identified and have been defined within ENGIE's Risk Management Plan (RMP) as:

> *A control that is crucial to preventing the event or mitigating the consequences of the event. The absence or failure of a critical control would significantly increase the risk*

despite the existence of the other controls. In addition, a control that prevents more than one unwanted event or mitigates more than one consequence is normally classified as critical.

ENGIE has engaged proactively in the identification, construction and implementation of critical controls since 2015. ENGIE selected their critical controls based on the guidance provided in the *Health and Safety Critical Control Management Good Practice Guide, published by the International Council on Mining and Metals (ICMM) 2015* representing the 'leading practice' for the management of major mining risk controls.

ENGIE currently have several existing critical controls nominated for the current (active rehabilitation) phase. These critical controls are relevant to current site conditions (including mine void water retention arrangements) and ENGIE Hazelwood's proposed pit lake filling works. These were selected based on the likely threats to be encountered during the initial mine lake filling stage and were assessed as part of a number of extensive Risk Assessments using BowtieXP software tool. The process was supported by the experience of the mine and a range of external technical discipline experts in recognising the contribution of the control to reduce the risk, either through prevention of the major nominated risk event, or mitigation of the outcome.

These existing critical controls were documented in the DMRP Risk Register as controls (highlighted in red text) and had a reference to the ID numbers listed in Table 6. These critical controls were reviewed and deemed to be relevant and still applicable for the first two phases of the Rehabilitation Project – Active and Passive Rehabilitation. However new sets of critical controls were identified for the final phase – Post Closure also currently shown in Table 6.

Table 6 describes the full list of critical controls identified in the DMRP risk assessment (including both existing and new critical controls).

Table 6 List of Critical Controls Identified

Critical Control	Control No	Control Type	Effectiveness	Responsibility	Active Rehabilitation	Passive Rehabilitation	Post Closure
Hazard: Mine Fire							
Plan – fire readiness (site on Low / Moderate / Severe / Extreme Days)	0094	Administrative	Good	Mine Production Manager	X	X	
Fire Services System – Remote / manual fire protection of exposed coal and batters	0206	Administrative	Good	Mine Services Superintendent	X	X	X
Design and placement of suitable mineral earth to cover exposed coal i.e. roads, rehabilitation, benches	0383	Engineering	Satisfactory	Technical Services Manager	X	X	X
Fire Services – Fire protection of exposed coal and mechanical plant (wetting down areas of exposed coal)	0443	Administrative	Good	Mine Production Manager	X	X	
Activate Emergency Response Plan	0616	Administrative	Good	Site – Security Manager	X	X	
Hazard: Batter and/or Mine Floor							
Aquifer depressurisation	0103	Engineering	Good	Technical Services Manager	X	X	
Design – Geometry of Batter, Bench, Surcharge Dump and Embankments	0119	Engineering	Very Good	Technical Services Manager	X	X	
Horizontal Drains	0231	Engineering	Very Good	Technical Services Manager	X		
Geotechnical Inspections	0245	Administrative	Good	Technical Services Manager	X	X	
Design and placement of suitable mineral earth to cover exposed coal i.e. roads, rehabilitation, benches	0383	Engineering	Satisfactory	Technical Services Manager			X
Operational and Maintenance of the MMD channel and Low Flow Pipe	0576	Engineering	Very Good	Technical Services Manager	X		
Monitoring of ground movement and hydrogeological conditions by instrumentation	0601	Administrative	Good	Technical Services Manager	X	X	
Penstock – 3GL Water Flow (Morwell River Flood Diversion Structure)	1107	Engineering	N/A *		X	X	
Maintain lake level RL+45m	0123	Engineering	Not Rated			X	
Hazard: Adverse Environment							
Aquifer depressurisation	0103	Engineering	Good	Technical Services Manager	X	X	
Design – Geometry of Batter, Bench, Surcharge Dump and Embankments	0119	Engineering	Very Good	Technical Services Manager	X	X	X
Horizontal Drains	0231	Engineering	Very Good	Technical Services Manager	X		
Fire Services – Fire protection of exposed coal and mechanical plant (wetting down areas of exposed coal)	0443	Administrative	Good	Mine Production Manager	X		
Operational and Maintenance of the MMD channel and Low Flow Pipe	0576	Engineering	Very Good	Technical Services Manager	X		
Monitoring of ground movement and hydrogeological conditions by instrumentation	0601	Administrative	Good	Technical Services Manager	X	X	
Aquifer water quality monitoring	1052	Administrative	N/A *			X	
Hazard: Site Security							
Activate Emergency Response Plan	0616	Administrative	Good	Site – Security Manager	X	X	
Site Access Control	0648	Administrative	Good	Security and Emergency Services Manager	X	X	

* N/A denotes potential critical control, 'Not Rated' denotes new critical control identified for Passive Rehabilitation phase, which does not have a critical control effectiveness rating assessed.

5.3 Critical Control Effectiveness

As discussed in section above, ENGIE has proactively engaged in the identification, construction and implementation of critical controls since 2015. The existing critical controls nominated for the current active rehabilitation phase are relevant to current site conditions (including mine void water retention arrangements) and ENGIE Hazelwood's proposed pit lake filling works. These critical controls for four key risk areas are:

- Major Mine Fire
- Batter and/or Mine Floor Failure
- Security
- Adverse Environment

These current critical controls were then reviewed as part of the current tranche of Risk Assessment workshops to support the DMRP submission with their effectiveness rated on the current performance of the control. The full list of critical control relevant for ENGIE across active rehabilitation, passive rehabilitation and post closure periods are included in Table 6.

Two critical controls were denoted as 'potential' and therefore did not have a performance standard assigned to them as they were not yet implemented onsite. These critical controls are now in the process of being updated, incorporated and supporting performance standards generated. One critical control was denoted as 'not rated' as this is a new critical control identified for the passive rehabilitation phase, not yet implemented.

For each listed critical control and where these controls are necessary for the passive and post closure periods, the associated actions for developing the associated Performance Standards have been detailed in the subsequent section.

6. Performance Standards

ENGIE has engaged proactively in the identification, construction and implementation of critical controls since 2015. ENGIE selected their critical controls based on the guidance provided in the *Health and Safety Critical Control Management Good Practice Guide, published by the International Council on Mining and Metals (ICMM) 2015* representing the 'leading practice' for the management of major mining risk controls.

Each of the critical controls have their own performance standards developed for them. The Critical Control Performance Standards (CCPS) include details such as:

- The risk event and management of the critical controls
- The specific objectives of each critical control
- The control performance requirements, including the target performance to be achieved
- Activities which may impact and support the critical control implementation
- A nominated verification process to ensure the control is operating effectively
- A trigger for shutdown, review or investigation
- Assigned ownership and reporting accountability for escalation

ENGIE have several critical controls nominated for the current (active rehabilitation) phase. These critical controls are relevant to current site conditions (including mine void water retention arrangements) and ENGIE Hazelwood's proposed pit lake filling works.

Refer to the following sections on the status for the current performance standards and which ones are to be developed for post closure.

6.1 Active and Passive Rehabilitation Performance Standards

For the DMRP submission the current site CCPS were reviewed and then updated for the active and passive rehabilitation periods with the new context of filling the mine void to RL+45m AHD. The status of each performance standard is summarised in Table 5 below.

Table 7 Current Critical Control Performance Standards

Critical Control	Control No	Control Type	Performance Standard Status
Hazard: Mine Fire			
Plan – fire readiness (site on Low / Moderate / Severe / Extreme Days)	0094	Administrative	Updated
Fire Services System – Remote / manual fire protection of exposed coal and batters	0206	Administrative	Updated
Design and placement of suitable mineral earth to cover exposed coal i.e. roads, rehabilitation, benches	0383	Engineering	Updated
Fire Services – Fire protection of exposed coal and mechanical plant (wetting down areas of exposed coal)	0443	Administrative	Updated
Activate Emergency Response Plan	0616	Administrative	Updated
Hazard: Batter and/or Mine Floor			
Aquifer depressurisation	0103	Engineering	Updated
Design – Geometry of Batter, Bench, Surcharge Dump and Embankments	0119	Engineering	Updated
Horizontal Drains	0231	Engineering	Updated
Geotechnical Inspections	0245	Administrative	Updated
Operational and Maintenance of the MMD channel and Low Flow Pipe	0576	Engineering	Updated
Monitoring of ground movement and hydrogeological conditions by instrumentation	0601	Administrative	Updated
Penstock – 3GL Water Flow (Morwell River Flood Diversion Structure)	1107	Engineering	Newly developed
Maintain lake level RL+45m	0123	Engineering	Newly developed
Hazard: Adverse Environment			
Aquifer depressurisation	0103	Engineering	Updated
Design – Geometry of Batter, Bench, Surcharge Dump and Embankments	0119	Engineering	Updated

Critical Control	Control No	Control Type	Performance Standard Status
Horizontal Drains	0231	Engineering	Updated
Fire Services – Fire protection of exposed coal and mechanical plant (wetting down areas of exposed coal)	0443	Administrative	Updated
Operational and Maintenance of the MMD channel and Low Flow Pipe	0576	Engineering	Updated
Monitoring of ground movement and hydrogeological conditions by instrumentation	0601	Administrative	Updated
Aquifer water quality monitoring	1052	Administrative	Newly developed
Hazard: Site Security			
Activate Emergency Response Plan	0616	Human Activity	Updated
Site Access Control	0648	Administrative	Updated

Refer to Appendix C for all active and passive performance standards.

6.2 Post Closure Performance Standards

In the post closure period, there will remain a requirement for some intervention to ensure the remaining risks during this period are maintained to SFAIRP. During the risk workshops, controls were identified for the post closure period. All of the post closure controls have been listed in Table 8 along with a corresponding Passive Rehabilitation CCPS. It is intended that as the post closure period nears the Passive Rehabilitation CCPSs would be converted to Post Closure Performance Standards which would explicitly address the control actions and control monitoring required for the post closure period. As ENGIE is currently only in the Active Rehabilitation phase (noting that key final rehabilitation works proposed to be implemented during this phase, including pit lake filling, depend on the approval of the DMRP), this was deemed as the most appropriate approach to ensure that learnings gleaned from the Active and Passive Rehabilitation period could be used to inform these Post Closure Standards. The Hazelwood DMRP Post Closure Monitoring and Maintenance Plan (Appendix C) will be progressively updated to incorporate monitoring and maintenance actions as they become available.

Table 8 Post Closure Controls

Post Closure Control	Control Type	Passive Rehabilitation CCPS	Typical Monitoring Requirements[1]
Hazard: Mine Fire			
Maintenance, integrity & design - capping	Administrative	CC 383 - Management of rehabilitation to cover exposed coal	Regular inspection and monitoring of the capping condition to maintain integrity for preventing and mitigating fire risks (e.g. capping remain insitu throughout rehabilitation phases)
Emergency access routes	Administrative	CC 206 - Vegetation Management / Grass Cutting / Firebreaks	Regular inspection and housekeeping activities to ensure no obstruction on emergency access routes Regular inspection to confirm signages are in place indicating clear path for emergency access routes
Fire breaks	Engineering	CC 206 - Vegetation Management / Grass Cutting / Firebreaks	Vegetation management activities to maintain vegetation growth and fire breaks
Hazard: Batter and/or Mine Floor			
Maintain pit void water level	Administrative	CC 123 – Maintain Lake Level RL+45m AHD	Regular sampling and monitoring of pit void water levels to maintain water levels at desired levels
Levees	Engineering	CC 119 - Design - Geometry of Batters, Benches, Embankment, Levees and Rehabilitation Design	Periodic inspection and monitoring of levee integrity, and perform required maintenance activities
Erosion Management	Administrative	CC 245 - Geotechnical Inspections (Inc. MMD redesign)	Periodic inspection and monitoring of surface movements to track erosion through use of suitable erosion monitoring methods

[1] These are typical monitoring requirements for the listed controls. Additional monitoring and maintenance requirements are given in *DMRP Chapter 15 – Monitoring and Maintenance* and are also covered extensively in ENGIE's supporting GCMP, FRMP and EMP.

Post Closure Control	Control Type	Passive Rehabilitation CCPS	Typical Monitoring Requirements[1]
Final landform design and land use	Engineering	CC 119 - Design - Geometry of Batters, Benches, Embankment, Levees and Rehabilitation Design	Periodic inspection and monitoring of landform condition and changes over extended period Perform regular maintenance activities to maintain final landform design / condition
Maintain, integrity & design - MMD	Engineering	CC 245 - Geotechnical Inspections (Inc. MMD redesign)	Periodic inspection, maintenance and condition reporting of MMD Periodic ground movement monitoring
Aquifer depressurization	Engineering	CC 103 – Aquifer Depressurization	Periodic geological monitoring and sampling of aquifer pressure in the area of interest
EPA Licensed Landfill Management	Administrative		Regular inspection and maintenance of landfill area to maintain integrity and isolation to prevent seepage / loss of containment
Hazard: Adverse Environment			
Pit void water quality – *Including overburden placed on mine floor to prevent heave.*	Administrative	CC 123 – Lake Water Quality	Periodic sample of pit void water quality against pre-determined water quality targets
Outlet structures	Engineering	CC 1107 - Morwell River Interconnection Structure	Periodic inspection, maintenance and condition reporting of outlet structures Regular weather monitoring regime to monitor and predict extreme rainfall events
Inlet structures	Engineering	CC 1107 - Morwell River Interconnection Structure	Periodic inspection, maintenance and condition reporting of inlet structures Regular weather monitoring regime to monitor and predict extreme rainfall events
Gross pollutant trap - MMD	Administrative	CC 245 - Geotechnical Inspections (Inc. MMD redesign)	Periodic inspection, maintenance and condition reporting of MMD Periodic ground movement monitoring

Post Closure Control	Control Type	Passive Rehabilitation CCPS	Typical Monitoring Requirements[1]
Hazard: Site Security			
Final landform design – *Inclusive of exclusion zones, beaching and public access.*	Engineering	CC 119 - Design - Geometry of Batters, Benches, Embankment, Levees and Rehabilitation Design	See above
Emergency access routes	Administrative	CC 616 - Activate Emergency Response Plan	See above

7. Roles & Responsibilities

In order to keep the PCRMP updated and relevant with the progression of the Rehabilitation Project, there are distinct roles and responsibilities that are defined in this section that must be adhered to.

The Hazelwood Rehabilitation Project Director / Project Manager is responsible for the overall implementation of the PCRMP and ensuring compliance with all legal and regulatory requirements during active and passive rehabilitation phases. This includes overseeing the implementation of all performance standards and validating that the verification processes are adhered to.

The specific responsibilities of the monitoring and maintenance of critical controls nominated across the three different rehabilitation phases are nominated within the performance standards shown in Appendix C and D. The roles and responsibilities of these critical controls should be reviewed along with the nominated review cycle for this plan nominated in Section 1.3.1. However, the Hazelwood Rehabilitation Project Director / Project Manager, during active and passive rehabilitation phases, is to review the full list of performance standards and make sure there is a process to review and renew the full list to see if any new performance standards should be developed.

The responsibility for maintaining the mine post-closure must be decided during the passive rehabilitation phase. This decision involves designating specific roles to ensure ongoing compliance with the PCRMP and any associated legal and regulatory standards.

These roles ensure that the site is safe and stable for all end-users to access and use.

8. Abbreviations

Table 9 Abbreviations

Abbreviation	Meaning
AHD	Australian Height Datum
ANCOLD	Australian National Committee on Large Dams
ASS	Acid Sulphate Soils
BESS	Battery Energy Storage System
CC	Critical Control
CCPS	Critical Control Performance Standard
CEMP	Construction Environment Management Plan
CHMP	Cultural Heritage Management Plans
CHS	Cultural Heritage Sensitivity
CL	Closure Liability
COPC	Contaminant of Potential Concern
CVA	Cultural Values Assessment

Abbreviation	Meaning
DMRP	Declared Mine Rehabilitation Plan
DSI	Detailed Site Investigation
EES	Environment Effects Statement
EMP	Environmental Management Plan
EOD	External Overburden Dump
EPA	Environment Protection Authority
FLPIP	Firmin's Lane Pond and Intermediate Pumping station
FRMP	Fire Risk Management Plan
FRV	Fire Rescue Victoria
GCMP	Ground Control Management Plan
HARA	Hazelwood Ash Retention Area
HARE	Hazelwood Ash Retaining Embankment
HCP	Hazelwood Cooling Pond
ICMM	International Council on Mining and Metals
MFAS	Morwell Formation Aquifer System
MLRA	Mine Line Rehabilitation Authority
MMD	Morwell Main Drain
MRSD	Mineral Resources Sustainable Development
NORP	Northern Overburn Runoff Pond
O&M	Operations and Maintenance
OB	Overburden
PCRMP	Post Closure Risk Management Plan
PFAS	Per- and polyfluoroalkyl substances
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance/Quantity Control
RAMP	Risk Assessment Management Plan
RAP	Reconciliation Action Plan
RCP	Rehabilitation and Closure Plan
RGS	Regional Geotechnical Study
RL	Reduced Level
RMP	Risk Management Plan
SCADA	Supervisory Control and Data Acquisition
SEPP	State Environmental Planning Policy
SFAIRP	So Far As Is Reasonably Practicable

Abbreviation	Meaning
SOB	South overburden
SPR	Source Pathway Receptor
SWOP	Surface Water Operations Plan
TARP	Trigger Action Response Plan
TFAS	Traralgon Formation Aquifer System
WEMP	Water Efficiency Management Plan

Appendix A – Risk Criteria

Table 10 Consequence Criteria

Severity	Consequence for "any member of the public" – public health, safety, amenity and Aboriginal heritage	Consequences for "land, property & infrastructure" beyond the boundary of the licence area	Consequences for "the environment" – air, water, soil, vegetation, flora & fauna species other than for planned and approved disturbances within the licence area
Critical Hazard has critical impact, in terms of severity and/or duration. Treatment or remediation effort is required, although some effects may be irreversible. Remediation of environmental contamination would require significant private and public resources. Hazard event would be the subject of widespread community outrage.	**Public health & safety:** One or more fatalities or life-threatening injuries or illness. Public exposed to a severely debilitating chronic health impact or life-threatening hazard. One or more injuries resulting in permanent disablement. **Public amenity:** Community or multiple individuals continuously experience major losses of amenity from dust, odour, fumes, noise, vibration or other similar hazards over periods of weeks or longer. **Aboriginal Heritage:** Harm to features and/or places of Indigenous cultural value. **Heritage:** Irreversible damage, or destruction of a place, object or historical archaeological site listed on the Commonwealth National Heritage List, Victorian Heritage Register, Victorian Heritage Inventory, or local Heritage Overlay.	**Land & land uses:** Permanent loss of production from primary production land >10 ha. Loss of annual – seasonal primary production from >100 ha of land. Irreversible or long-term environmental damage (with rehabilitation taking years or longer) to >1 ha of National Park or other conservation reserve. **Public & private property:** Total damage to private or public property or infrastructure or loss of income resulting from this damage >$10 million. Total loss of value of private property equivalent to >$10 million. **Services provided by infrastructure:** Important community services (e.g. transport, energy, health, telecommunications, education, water) suspended or significantly disrupted for extended period (weeks or longer).	**Environmental contamination event:** Environmental contamination event (of air, soil-land and/or water) of a magnitude that a State-level incident response is required. Incident response, clean-up and rehabilitation expected to run for years and/or cost ≥$10 million. **Native vegetation, flora species or fauna species:** Environmental contamination event or other form of environmental damage leading to bioregional, State or national extinction of listed threatened species of native flora or fauna or vegetation community. Irreversible or long-term (years) damage or environmental harm to ≥10 ha of native vegetation (not listed threatened vegetation community) or to ≥1 ha listed threatened native vegetation community. Deaths of hundreds (or more) of listed native flora or fauna species or native mammals. Contamination or other environmental damage leading to deaths of native fauna well beyond (>1 km) the boundaries of the operation. **Surface water or groundwater:** Contamination of surface water / groundwater aquifer leading to change in environmental values as defined by Environmental Reference Standard for more than year. Water extraction or diversion reduces surface water flows or groundwater available for environmental uses, with a critical effect on dependent species or ecosystems well beyond (>1 km) the boundaries of the operation that is irreversible or long-term (years).

Severity	Consequence for "any member of the public" – public health, safety, amenity and Aboriginal heritage	Consequences for "land, property & infrastructure" beyond the boundary of the licence area	Consequences for "the environment" – air, water, soil, vegetation, flora & fauna species other than for planned and approved disturbances within the licence area
Major Hazard has major impact, in terms of severity, duration and/or frequency of occurrence. Treatment or remediation effort is required. Some effects may be irreversible. Remediation of environmental contamination would require significant private and public resources. Hazard event would be the subject of widespread community concern.	**Public health & safety:** One or more injuries or illness requiring surgery or resulting in long-term disablement. Public exposed to a hazard that results in hospitalization for treatment from injury or illness. **Public amenity:** Community or multiple individuals regularly experience (weekly-monthly basis) major losses of amenity due to dust, odour, fumes, noise, vibration or other similar hazards for multiple days on end. **Heritage:** Damage to a place, object or historical archaeological site listed on the Commonwealth National Heritage List, Victorian Heritage Register, Victorian Heritage Inventory, or local Heritage Overlay. Removal or relocation of elements associated with places, objects or historical archaeological sites.	**Land & land uses:** Permanent loss of production from primary production land <10 ha. Loss of annual – seasonal primary production from 10-100 ha of land. Irreversible or long-term environmental damage to <1 ha of National Park or other conservation reserve or to ≥10 ha of other public land. Reversible damage to ≥1 ha of National Park or other conservation reserve or to ≥10 ha of other public land. **Public & private property:** Total damage to private or public property or infrastructure or loss of income resulting from this damage $1-$10 million. Total loss of value of private property equivalent to $1-$10 million. **Services provided by infrastructure:** Important community services (e.g. transport, energy, health, telecommunications, education) suspended or significantly disrupted for days or experiencing minor disruptions for long periods (weeks or longer).	**Environmental contamination event:** Environmental contamination event (of air, soil-land and/or water) of a magnitude that would necessitate a regional emergency response management incident response. Clean-up and rehabilitation expected to run for months and/or cost $1-$10 million. **Native vegetation, flora species or fauna species:** Environmental contamination event or other form of environmental damage leading to local extinction of listed threatened species of native flora or fauna or vegetation community. Deaths up to ~100 listed native flora or fauna species or native mammals. Major damage or environment harm to 1-10 ha of native vegetation (not listed threatened vegetation community) or to <1 ha listed threatened native vegetation community that will be irreversible or take years to recover from. **Surface water or groundwater:** Contamination of surface water / groundwater aquifer leading to change in environmental values as defined by Environmental Reference Standard for up to one year. Water extraction or diversion reduces surface water flows or groundwater available for environmental uses, with a major effect on dependent species or ecosystems that will be irreversible or take years to recover from.

Severity	Consequence for "any member of the public" – public health, safety, amenity and Aboriginal heritage	Consequences for "land, property & infrastructure" beyond the boundary of the licence area	Consequences for "the environment" – air, water, soil, vegetation, flora & fauna species other than for planned and approved disturbances within the licence area
Moderate Hazard has moderate impact, in terms of severity, duration and/or frequency of occurrence. Moderate treatment or remediation effort may be required. Hazard event would be the subject of limited community concern.	**Public health & safety:** One or more injuries or illness requiring treatment by a physician or hospitalisation. Public exposed to a hazard that results in injuries or health effects requiring treatment by a physician. **Public amenity:** Community or multiple individuals regularly (weekly-monthly basis) experience significant loss of amenity from dust, odour, fumes, light, noise, vibration or other similar hazards. **Heritage:** Works to a place, object or historical archaeological site that will not alter the cultural significance as stated on the Commonwealth National Heritage List, Victorian Heritage Register, Victorian Heritage Inventory, or local Heritage Overlay.	**Land & land uses:** Loss of annual – seasonal primary production from <10 ha of land. Short-term (days – weeks) disruption to 10-100 ha of primary production land. Reversible damage to <1 ha of National Park or other conservation reserve or to <10 ha of other public land. **Public & private property:** Individual hazard event causes total damage to private or public property or infrastructure or loss of income resulting from this damage $50k - $1 million. Total loss of value of private property equivalent to $1-$10 million. **Services provided by infrastructure:** Important community services (e.g. transport, energy, health, telecommunications, education) suspended or significantly disrupted for up to 1 day or experiencing minor disruptions for weeks.	**Environmental contamination event:** Environmental contamination event (of air, soil-land and/or water) with clean-up and rehabilitation expected to run for weeks and/or cost $10k -$1 million. **Native vegetation, flora species or fauna species:** Environmental contamination event or other form of environmental damage leading to deaths of a small number of listed threatened flora or fauna species or native mammals. Reversible damage or environment harm to <10 ha of non-listed native vegetation or <1 ha of listed native vegetation community. **Surface water or groundwater:** Localised contamination of surface water / groundwater aquifer leading to change in environmental values as defined by Environmental Reference Standard for weeks to months. Water extraction or diversion reduces surface water flows or groundwater available for environmental uses, with a noticeable but short term (weeks or days) effect on dependent species or ecosystems.

Severity	Consequence for "any member of the public" – public health, safety, amenity and Aboriginal heritage	Consequences for "land, property & infrastructure" beyond the boundary of the licence area	Consequences for "the environment" – air, water, soil, vegetation, flora & fauna species other than for planned and approved disturbances within the licence area
Minor Hazard is perceived but has minor and typical temporary effects. Some remediation may be required.	**Public health & safety:** One or more injuries or illness requiring first aid treatment. Public exposed to a hazard that results in injuries or adverse health effects requiring first aid treatment. **Public amenity:** Dust, odour, fumes, light, noise, vibration or other similar hazards infrequently (no more than monthly) have a minor effect on the amenity of the community or individual. **Heritage:** Isolated damage to regionally or locally significant natural or historic heritage features that is readily rectified.	**Land & land uses:** Minor damage to agricultural land or public land not requiring active rehabilitation. Temporary and small scale disruption to agricultural production (days, 1 – 10ha). **Public & private property:** Total damage to private or public property or infrastructure $1 - $50k. Total loss of value of private property equivalent to $1 - $50k. **Services provided by infrastructure:** Important community services (e.g. transport, energy, health, telecommunications, education) suspended or significantly disrupted for short period (hours).	**Environmental contamination event:** Minor environmental contamination event (of air, soil-land and/or water). Clean-up and rehabilitation may be required, but can be completed within days. **Native vegetation, flora species or fauna species:** Minor damage or environment harm to <1 ha of native vegetation (not listed threatened vegetation community) that can be recovered in weeks to months. Minor contamination or other environmental damage that affects native fauna species populations, but does not kill individuals or disrupt breeding or other important ecological processes. **Surface water or groundwater:** Minor contamination of natural watery or wetland occurs, but water quality remains within applicable EPA or ANZECC guidelines for existing environmental values. Water extraction or diversion reduces surface water flows or groundwater available for environmental uses, but with no detectable effect on dependent species or ecosystems and carried out within terms of water license.

Severity	Consequence for "any member of the public" – public health, safety, amenity and Aboriginal heritage	Consequences for "land, property & infrastructure" beyond the boundary of the licence area	Consequences for "the environment" – air, water, soil, vegetation, flora & fauna species other than for planned and approved disturbances within the licence area
Insignificant Impacts are barely recognized and/or quickly recovered from. No specific remediation required.	**Public health & safety:** An injury or ailment that does not require medical or first aid treatment. **Public amenity:** Dust, odour, fumes, light, noise, vibration or other similar hazards infrequently (no more than monthly) contribute to a small reduction in the amenity of the community or individual.	**Land & land uses:** Minor, temporary disruptions to primary production (<days) from <1 ha of land. **Public & private property:** Total damage to private or public property or infrastructure <$1k. Total loss of value of private property equivalent to <$1k. **Services provided by infrastructure:** Important community services (e.g. transport, energy, health, telecommunications, education) maintained, but experiencing minor disruptions or delays.	Hazard event with minimal environmental impact and no noticeable effect beyond the immediate occurrence or expression of the hazard.

Table 11 Likelihood Criteria

Likelihood	Description	Probability of Event Occurring
Almost Certain	The risk event is expected to occur in most circumstances.	90 – 100%
Likely	The risk event will probably occur in most circumstances.	70 – 90%
Possible	The risk event might occur at some time.	30 – 70%
Unlikely	The risk event could occur in some uncommon circumstances.	5 – 30%
Rare	Highly unlikely, but the risk event may occur in exceptional circumstances.	0 – 5%

Table 12 Risk Assessment Matrix

	Insignificant	Minor	Moderate	Major	Critical
Rare	Low	Low	Medium	Medium	High
Unlikely	Low	Low	Medium	High	High
Possible	Low	Medium	Medium	High	Very High
Likely	Medium	Medium	High	Very High	Very High
Almost Certain	Medium	High	Very High	Very High	Very High

Appendix B – DMRP Risk Register

{Refer to DMRP *Appendix I - DMRP Risk Register*}

Appendix C – Active and Passive Critical Control Performance Standards

Prepare and Issue Site Fire Readiness Plan		
Responsible Officer	Hazelwood Services Superintendent	
Link to bowtie analysis / risk assessment	Historically having effective emergency response resources onsite early on in the event will reduce the severity / impact of the event and reduce the impact of the outcome / consequence	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Arson or other malicious act committed on site	Threat: Arson or other malicious act committed on site
	Threat: Building fire (e.g. administration, workshop, amenities)	Threat: Building fire (e.g. administration, workshop, amenities)
	Threat: Fire started by external party on site (e.g. utility service operations, leasee farmers)	Threat: Fire started by external party on site (e.g. utility service operations, leasee farmers)
	Threat: Lightning strike	Coal fire due to an external running fire entering the mine onto coal surface(s)
	Coal fire due to an external ember attack	Vegetation fire
	Coal fire caused by internal fire	
Critical Control	Preparation and issue of the Site Fire Readiness Plan allows review of the potential threats prior to the advent of a high fire risk day and the implementation of further controls specific to the forecast level of fire risk. This may include organising additional resources, ceasing Hot Works, stopping maintenance activities within the mine, wetting at risk coal areas before the hot weather arrives, etc. This is a critical control for addressing potential mine fire.	
Specific Objectives	When weather forecast from the Bureau of Meteorology (BOM) meets the trigger for at least a High and Extreme and Catastrophic Risk Period:	
	A review of the mine readiness is undertaken	
	An assessment of the required additional resources is made and additional resources are allocated	
	All personnel are notified of the expected conditions and planned actions prior to the day.	
Performance Requirements	The Mine Services Supervisor will initiate the development of a Readiness Plan, as part of the normal review of FFDR / FFDI and weather forecasts, the checklists are listed in the Activities.	
	The Readiness Plan is issued on the day prior to the risk day or as soon as practical after a changed BOM weather forecast, which exceeds the trigger ratings on the day.	
	The activities selected as required on the Plan must be appropriate for level of risk determined from the ratings	
	All the activities marked as required are undertaken for each plan issued	
	The Proforma is reviewed annually and updated to reflect mine changes and any procedure or regulatory requirements	
Activities	Daily review of weather forecasts against trigger levels for readiness plan issued	Mine Services Supervisor Daily Work Area Inspection (PID: 51762)
		Mine Fire Readiness Planning Guidelines (PID: 36546)

Prepare and Issue Site Fire Readiness Plan		
	Access to blank proforma in document management system	High Fire Readiness Checklist and Plan (PID: 55855 and 55854) and Extreme and Catastrophic Risk Period Site Fire Readiness Checklist and Plan (PID: 55859 and 55856)
	All 1x7 supervisors and 'step-up's trained in the fire readiness trigger levels and preparation and issue of the readiness plan	High Fire Readiness Checklist and Plan (PID: 55855 and 55854) and Extreme and Catastrophic Risk Period Site Fire Readiness Checklist and Plan (PID: 55859 and 55856)
Verification Process	Readiness plan issued to regulators (DEECA and FRV)	Mine Services Superintendent
	Planned annual audits by regulators	External - DEECA
	Received by all EC's and ESLO's	EC's and ESLO's
	Annual fire documentation review	Hazelwood Rehabilitation Project Director
Target Performance	100% compliance with issue of a readiness plan when a day exceeds the Severe Fire Risk trigger levels	
Trigger for shutdown, review or investigation	A day that exceeds the High and Extreme and Catastrophic Readiness trigger level where a Readiness Plan is not issued	
Effectiveness and Escalation	A notice issued by the regulator will escalate an issue to the Hazelwood Rehabilitation Project Director.	
	Weekly Hazelwood Rehabilitation Project Management meetings review the expectation of fire readiness for the coming week.	
	The Hazelwood Mine Fire Readiness Planning Guidelines has been used by the Regulator as an example of Best Practice within the local industry.	

Prepare and Issue Site Fire Readiness Plan		
Responsible Officer	Hazelwood Rehabilitation Project Manager	
Link to bowtie analysis / risk assessment	Historically having effective emergency response resources onsite early on in the event will reduce the severity / impact of the event and reduce the impact of the outcome / consequence	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Arson or other malicious act committed on site	Threat: Arson or other malicious act committed on site
	Threat: Building fire (e.g. administration, workshop, amenities)	Threat: Building fire (e.g. administration, workshop, amenities)
	Threat: Fire started by external party on site (e.g. utility service operations, leasee farmers)	Threat: Fire started by external party on site (e.g. utility service operations, leasee farmers)
	Threat: Lightning strike	Coal fire due to an external running fire entering the mine onto coal surface(s)
	Coal fire due to an external ember attack	Vegetation fire
	Coal fire caused by internal fire	
Critical Control	Preparation and issue of the Site Fire Readiness Plan allows review of the potential threats prior to the advent of a high fire risk day and the implementation of further controls specific to the forecast level of fire risk.	
Specific Objectives	When weather forecast from the Bureau of Meteorology (BOM) meets the trigger for at least an Extreme, Code Red Fire Risk Period:	
	A review of the mine lake and surrounds fire readiness is undertaken	
	An assessment of the required additional resources is made and additional resources are allocated	
	All personnel are notified of the expected conditions and planned actions prior to the day.	
Performance Requirements	The Hazelwood Rehabilitation Project Manager will initiate the development of a Readiness Plan, as part of the normal review of FFDR / FFDI and weather forecasts, the checklists are listed in the Activities.	
	The Readiness Plan is issued on the day prior to the risk day or as soon as practical after a changed BOM weather forecast, which exceeds the trigger ratings on the day.	
	The activities selected as required on the Plan must be appropriate for level of risk determined from the ratings	
	All the activities marked as required are undertaken for each plan issued	
	The Proforma is reviewed annually and updated to reflect mine lake and surrounds changes and any procedure or regulatory requirements	
Activities	Daily review of weather forecasts against trigger levels for readiness plan issued	Mine Fire Readiness Planning Guidelines (PID: 36546)
	Access to blank proforma in document management system	Extreme and Catastrophic Risk Period Site Fire Readiness Checklist and Plan (PID: 55859 and 55856)

Prepare and Issue Site Fire Readiness Plan		
	All site personnel trained in the fire readiness trigger levels and preparation and issue of the readiness plan	Extreme and Catastrophic Risk Period Site Fire Readiness Checklist and Plan (PID: 55859 and 55856)
Verification Process	Readiness plan issued to regulators (DEECA and FRV)	Hazelwood Rehabilitation Project Manager
	Planned annual audits by regulators	External - DEECA
	Received by all EC's and ESLO's	EC's and ESLO's
	Annual fire documentation review	Hazelwood Rehabilitation Project Manager
Target Performance	100% compliance with issue of a readiness plan when a day exceeds the Extreme Fire Risk trigger levels	
Trigger for shutdown, review or investigation	A day that exceeds the Extreme or Catastrophic Fire Readiness trigger level where a Readiness Plan is not issued.	
Effectiveness and Escalation	A notice issued by the regulator will escalate an issue to the Hazelwood Rehabilitation Project Steering Committee.	

Fire Service System		
Responsible Officer	Hazelwood Services Superintendent	
Link to bowtie analysis / risk assessment	Historically wetting down areas of exposed coal has prevented fires from starting and / or spreading as the water provides a non-combustible barrier and extinguishes fire.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat. Mobile plant/ Light vehicle fire	
	MMH Outcome: Emissions impacting health on-site (including CO, CO2, Smoke, Ash).	
	MMH Outcome: Entrapment (buildings, vehicles, plant)	
	RMP Outcome: Ash and smoke pollution to environment (environmental contamination event)	
	RMP Outcome: Damage to critical power supply infrastructure leading to outages (services provided by infrastructure)	
	RMP Outcome: Health effects on sensitive receptors (public health and safety)	
	Coal fire due to an external running fire entering the mine onto coal surface(s)	Vegetation fire
	Coal fire due to an external ember attack	Coal fire caused by internal fire
Critical Control	Suitable infrastructure to enable the ability to provide adequate supply of water onto the coal surfaces and general mine reticulation to assist in the prevention of fires starting and / or spreading and in early extinguishment of fires.	
Specific Objectives	The Mine Fire Service System should have the capacity to supply water to operate whichever is the greater of either Option A or Option B of the maximum demand criteria in accordance with the Mine Fire Service Policy (PID: 2589) and supporting documents.	
	The Mine Fire Service System must be designed such that water supply is available from at least two sources, in order for the loss of any one system or pumping station to not reduce the supply available below 50% of the designed maximum demand.	
	Wetting down areas of exposed coal reducing the risk of fire impacts.	
Performance Requirements	Compliance with the Mine Fire Service Policy (PID: 2589) to ensure:	
	A Hydraulic model is generated on an annual basis, in accordance with the Asset Management Plan. This informs the requirements for the fire service system;	
	Design compliance with the Hydraulic model and pipe layout requirements;	
	Installation of infrastructure by trained and competent personnel and contractors, based on the design;	
	Maintenance of fire service system to ensure serviceability;	
	Availability of the Fire Service System to provide water to operational areas, non-operational areas and mechanical plant; and	
	Availability of supply of water	
Activities	Annual Hydraulic modelling design of fire service mains network	Hydraulic model records.
	Construction to design using competent contractors and personnel	Use contractors who are approved for undertaking works onsite

Fire Service System		
	As built survey and drawings to confirm design	Piping and Instrumentation Diagrams and layout drawings
	Annual Aerial photo / plan to review fire service network	Fire Readiness Planning Guidelines (PID: 36549).
	Fire Management System - Report on status of the fire service network	Fire Readiness Planning Guidelines (PID: 36546)
	Weekly Pump Operation Inspection undertaken by Mine Services Work Group	Weekly Pump Inspection (PID: 51770).
	Annual (Preliminary & Final) Fire Fighting Equipment Inventory & Inspection	Annual Fire Fighting Equipment Inventory & Inspection (PID: 51848).
	Monthly, 6 Monthly & Annual Safety Device Testing	Safety Device Testing Schedules & Inspection Records.
	Fortnightly water level monitoring at the Mine Lake	PID 53065 – Water Quality Procedure
	Risk based approach to fire management in areas to be rehabilitated	Hazard Identification and Risk Management Procedure (PID: 2883)
Verification Process	Completion of safety device testing and reporting (as noted above).	Mine Services Superintendent
	Hydraulic modelling reports reviewed	Mine Services Superintendent
	As built drawings reviewed after project to ensure installation is to design	Mine Services Superintendent
	Documented training records for Contractors and personnel.	Human Resources
	Records of all inspections.	Mine Services Superintendent
	Fire Management System - Weekly Status Report discussed in weekly Hazelwood Rehabilitation Project Management Meeting	Mine Services Superintendent
	Annual aerial photo / plan.	Mine Services Superintendent
	Project Risk Assessment	Hazelwood Rehabilitation Project Director
Target Performance	Inspection, testing and maintenance in accordance with schedules.	
	Utilisation of the Maintenance Management System for defect recording.	
	100% compliance of Hydraulic Modelling design to the Mine Fire Service Policy (PID: 2589)	
	100% of infrastructure installed is in compliance with the design	
	100% availability of the fire service system for wetting down of specific areas of the mine eg working levels, when required	
	Wetting of no less than 50% of remaining exposed coal.	
Trigger for shutdown, review or investigation	Major fault / non-conformance detected during above inspections and testing.	
	Major fire with potential to impact upon the environment, public safety and business.	

Fire Service System	
	Loss of water or power supply to pumps (impairment notice)
	Non-compliance of Fire Management System - Weekly Status Report (RAG Report)
Effectiveness and Escalation	Continual use on a daily basis showing effectiveness against performance requirements, especially on Mine severe and extreme fire readiness days
Effectiveness and Escalation	Fire Management System - Weekly Status Report (RAG Report), goes to Weekly Hazelwood Rehabilitation Project Management Meeting.
	Failures or non-conformances and identification of 2 or more ‘High Risk’ items on the Fire Management System - Weekly Status Report to be raised with the Hazelwood Rehabilitation Project Director for further action.

Vegetation Management / Grass Cutting / Firebreaks		
Responsible Officer	Hazelwood Rehabilitation Project Manager	
Link to bowtie analysis / risk assessment	Historically maintaining vegetation via grass cutting and the installation of firebreaks has prevented fires from starting and / or spreading as the short grass reduces fuel load and the firebreaks provide a non-combustible barrier.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	RMP Outcome: Ash and smoke pollution to environment (environmental contamination event)	
	RMP Outcome: Damage to critical power supply infrastructure leading to outages (services provided by infrastructure)	
	RMP Outcome: Health effects on sensitive receptors (public health and safety)	
	Coal fire due to an external running fire entering the mine onto coal surface(s)	Vegetation fire
	Coal fire due to an external ember attack	Coal fire caused by internal fire
Critical Control	Vegetation management and grass cutting and the installation and maintenance of firebreaks.	
Specific Objectives	Reduce grass fuel load and create firebreaks to provide a non-combustible barrier.	
Performance Requirements	All areas of grass surrounding the mine and the rehabilitated mine batters are under an annual maintenance regime which keeps grass fuel loads low and keeps firebreaks functional and free from vegetation.	
Activities	Annual Aerial photo / plan to review any coal exposure and grass uptake.	Fire Readiness Planning Guidelines (PID: 36549).
	Fortnightly water level monitoring at the Mine Lake	PID 53065 – Water Quality Procedure
Verification Process	Documented training records for Contractors and personnel.	Human Resources
	Records of all inspections.	Hazelwood Rehabilitation Project Manager
	Annual aerial photo / plan.	Hazelwood Rehabilitation Project Manager
	Project Risk Assessment	Hazelwood Rehabilitation Project Manager
Target Performance	100% completion rate of the Annual Aerial photo / plan to review any coal exposure and grass uptake.	
	100% of assigned activities, grass cutting and firebreak maintenance.	
Trigger for shutdown, review or investigation	Major fault / non-conformance detected during above inspections and testing.	
	Major fire with potential to impact upon the environment, public safety and business.	
Effectiveness and Escalation	Failures or non-conformances and identification of 2 or more ‘High Risks’ to be raised with the Hazelwood Rehabilitation Project Steering Committee.	

Design and placement of suitable mineral earth to cover exposed coal, i.e. roads, rehabilitation, benches etc.		
Responsible Officer	Hazelwood Services Superintendent	
Link to bowtie analysis / risk assessment	Historically it has been observed that clay and / or crushed rock covering has prevented coal fires from starting as the placement of the clay provides a non-combustible barrier to the coal surfaces. It also reduces / eliminates oxygen to sub-surface potential ignition sources.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Building fire (e.g. administration, workshop, amenities)	Threat: Lightning strike
	Threat: Electrical fault	Threat: Sub-surface combustion (burn hole)
	Threat: Stationary or mobile equipment fire (e.g. pump, generator)	Threat: Arson or other malicious act committed on site
	Threat: Exposed coal	Threat: Refuelling with petrol in the field
	Threat: Fire started by external party on site (e.g. utility service operations, lessee farmers)	Threat: Use / disposal of match, lighter or lit cigarette
	Threat: Inappropriate equipment on site	Threat: Work activity generating friction (e.g. pipe dragging, skid dragging)
	Threat: Spontaneous combustion of loose coal	Threat: Sparks, embers or fire from external sources
	Threat: Use of tools and equipment in mine boundary, producing sparks, friction or flame (including hot works)	Threat: Ignition of cutting charges (third party)
	Coal fire due to an external running fire entering the mine onto coal surface(s)	Coal fire caused by internal fire
	Coal fire due to an external ember attack	
Critical Control	Using a physical non-combustible barrier (e.g. clay or crushed rock) to prevent fires from starting on a coal surface. Experience from mining indicates capping depths of 75 mm and above are adequate to provide this level of protection in most situations, heat sources below the ground may require additional cover.	
	This Critical Control is one form of protecting the coal surface and specifically covers:	
	Benches and berms	
	Service areas and corridors	
	Rehabilitated coal batters	
	This critical control does not apply to:	
	Exposed coal on mine batters that are covered by fire service sprays or tanker filling points	
Specific Objectives	In coal areas which have been clay and / or crushed rock covered:	
	Coal fires will not occur in areas where coal has been covered by clay and / or crushed rock; and	
	Heat will not result in coal fires from known or suspected heat sources below the ground.	

Design and placement of suitable mineral earth to cover exposed coal, i.e. roads, rehabilitation, benches etc.		
Performance Requirements	Compliance with the Mine Fire Service Policy (ID: 2589) to ensure that:	
	Benches / berms are clay and / or crushed rock covered;	
	Clay capping of rehabilitated coal batters above RL +45;	
	Clay capping remains insitu for life of mine until rehabilitation is undertaken; and	
	Placement of suitable material for area.	
	Rehabilitation and Closure activities are carried out in accordance with the approved Rehabilitation Plan.	
Activities	Placement of suitable material eg clay and / or crushed rock on defined exposed coal areas, excluding coal batters below RL +45.	Mine Fire Service Policy (PID: 2589).
		Rehabilitation Plan
	Placement of clay over known areas of interest (burn holes) below the ground which are likely to result in a fire on the surface.	INX Incident / Hazard Management System. Monitoring Areas if Interest Procedure (PID: 50957)
	Clay capping of rehabilitated coal batters above RL +45.	Design provided by Hazelwood - Technical Services Manager.
Verification Process	Annual inspection to be conducted for compliance with clay and / or crushed rock placement requirements through the Fire Fighting Equipment Annual Inspection (PID: 51848).	Mine Services Superintendent
	Rehabilitated coal batters capped with clay, above RL +45.	Hazelwood - Technical Services Manager.
	Annually reporting to DEECA of rehabilitation activities as outlined in the approved Rehabilitation Plan.	Hazelwood - Technical Services Manager.
Target Performance	100% compliance of clay and / or crush rock covering berms / benches, excluding exposed coal batters below RL +45.	
	All INX actions requiring clay capping of areas of interest are completed.	
	100% Conformance with the Rehabilitation Plan.	
	100% of rehabilitated coal batters capped with clay.	
Trigger for shutdown, review or investigation	Non-conformance with Rehabilitation Plan, annual inspections	
	Outbreak of fire on coal surface where capping has been undertaken.	
Effectiveness and Escalation	All defined areas have been clay and/or crushed rock capped	
	ENGIE has 100% compliance with the Rehabilitation Plan.	
	During previous fires in the mine capped areas have been an effective means of fire protection	
	Notice from the regulator, in regards to the Rehabilitation Plan, will result in escalation to the Hazelwood Rehabilitation Project Director.	
	Fire Fighting Equipment Annual Inspection, goes to the Mine Services Superintendent for review and approval.	

Design and placement of suitable mineral earth to cover exposed coal, i.e. roads, rehabilitation, benches etc.	
	Failures or non-conformances identified in the Fire Fighting Equipment Annual Inspection Report would be raised with the Hazelwood Rehabilitation Project Director.

Management of rehabilitation to cover exposed coal.		
Responsible Officer	Hazelwood Rehabilitation Project Manager	
Link to bowtie analysis / risk assessment	Historically it has been observed that clay and / or crushed rock covering has prevented coal fires from starting as the placement of the clay provides a non-combustible barrier to the coal surfaces. It also reduces / eliminates oxygen to sub-surface potential ignition sources.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Building fire (e.g. administration, workshop, amenities)	Threat: Lightning strike
	Threat: Electrical fault	Threat: Sub-surface combustion (burn hole)
	Threat: Stationary or mobile equipment fire (e.g. pump, generator)	Threat: Arson or other malicious act committed on site
	Threat: Exposed coal	Threat: Refuelling with petrol in the field
	Threat: Fire started by external party on site (e.g. utility service operations, lessee farmers)	Threat: Use / disposal of match, lighter or lit cigarette
	Threat: Inappropriate equipment on site	Threat: Work activity generating friction (e.g. pipe dragging, skid dragging)
	Threat: Spontaneous combustion of loose coal	Threat: Sparks, embers or fire from external sources
	Threat: Use of tools and equipment in mine boundary, producing sparks, friction or flame (including hot works)	Threat: Lowered lake level results in exposed coal.
	Coal fire due to an external running fire entering the mine onto coal surface(s)	Coal fire caused by internal fire
	Coal fire due to an external ember attack	
Critical Control	Using a physical non-combustible barrier (e.g. clay or crushed rock) to prevent fires from starting on a coal surface above the final lake level of RL+45m AHD.	
	This Critical Control is one form of protecting the coal surface and specifically covers:	
	Rehabilitated coal batters	
Specific Objectives	In coal areas which have been clay and / or crushed rock covered:	
	Coal fires will not occur in areas where coal has been covered by clay and / or crushed rock; and	
	Heat will not result in coal fires from known or suspected heat sources below the ground.	
Performance Requirements	Rehabilitation and Closure activities are carried out in accordance with the approved Rehabilitation Plan.	
	All coal above RL +45m AHD is covered by rehabilitation, clay, topsoil and grass and is maintained.	
Activities	Rehabilitation and maintenance of all rehabilitated mine batters.	Rehabilitation Plan
Verification Process	Rehabilitated coal batters capped with clay, topsoil and grass above RL +45.	Hazelwood Rehabilitation Project Manager

	Annually reporting to DEECA of rehabilitation activities as outlined in the approved Rehabilitation Plan.	Hazelwood Rehabilitation Project Manager
Target Performance	100% compliance of clay and / or crush rock covering berms / benches, excluding exposed coal batters below RL +45.	
	100% Conformance with the Rehabilitation Plan.	
Trigger for shutdown, review or investigation	Non-conformance with Rehabilitation Plan, annual inspections	
	Outbreak of fire on coal surface where capping has been undertaken.	
Effectiveness and Escalation	ENGIE has 100% compliance with the Rehabilitation Plan.	
	During previous fires in the mine capped areas have been an effective means of fire protection.	
	Notice from the regulator, in regards to the Rehabilitation Plan, will result in escalation to the Hazelwood Rehabilitation Project Manager	

Fire Services – Fire protection of exposed coal (wetting down areas of exposed coal)		
Responsible Officer	Hazelwood Services Superintendent	
Link to bowtie analysis / risk assessment	Historically wetting down areas of exposed coal / mechanical plant has prevented fires from starting and / or spreading as the water provides a non-combustible barrier and extinguishes fire.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Arson or other malicious act committed on site	Threat: Refuelling with petrol in the field
	Threat: Building fire (e.g. administration, workshop, amenities)	Threat: Sparks, embers or fire from external sources
	Threat: Electrical fault	Threat: Spontaneous combustion of loose coal
	Threat: Exposed coal	Threat: Stationary or mobile equipment fire (e.g. pump, generator)
	Threat: Fire started by external party on site (e.g. utility service operations, lessee farmers)	Threat: Sub-surface combustion (burn hole)
	Threat: Flammable material or fuel storage fire	Threat: Use / disposal of match, lighter or lit cigarette
	Threat: Ignition of cutting charges (third party)	Threat: Use of tools and equipment in mine boundary, producing sparks, friction or flame (including hot works)
	Threat: Inappropriate equipment on site	Threat: Vegetation fire (e.g. grass, hay bales, trees)
	Threat: Lightning strike	Threat: Work activity generating friction (e.g. pipe dragging, skids dragging)
	Threat: Mobile plant/ Light vehicle fire	Coal fire due to an external running fire entering the mine onto coal surface(s)
	Coal fire due to an external ember attack	Coal fire caused by internal fire
	Dust from exposed surfaces	
Critical Control	This is a human activity and technological critical control. The human activity aspect is the application of water onto the coal surfaces, this will assist to prevent fires from starting and / or spreading, triggered by forecasted weather conditions or a detected fire / heat event onsite. The application of water will also assist in extinguishing of fires onsite from external sources. The technological aspect is the mine fire services system to wet down exposed and non-exposed coal and other mine areas (coal, roads, mechanical plant etc) to prevent a fire starting or to mitigate the escalation of any fire to become a threat to public safety and the environment.	
Specific Objectives	Compliance with the Mine Fire Service Policy (PID: 2589) to ensure that:	
	Supply of water infrastructure to areas of exposed coal;	
	Effective operation of the fire service network utilising skilled and competent personnel to prevent, contain and extinguish fires; and	
	Fire service system available and operated when forecast weather conditions indicate there is a fire threat.	
Performance Requirements	All relevant onsite personnel will be trained to activate fire sprays and portable fire equipment.	
	Daily monitoring of weather conditions, by the Mine Services Group.	
	Distribution and implementation of Fire Readiness Plan on days of High and Extreme and Catastrophic risk days.	

Fire Services – Fire protection of exposed coal (wetting down areas of exposed coal)	
	Through the use of reticulated fire service systems and portable equipment the fire protection network is to be: - Capable of wetting exposed coal; Capable of assisting to extinguish fires. - Capable of wetting and reducing the risk of damage to mine infrastructure from fire.

Fire Services – Fire protection of exposed coal and mechanical plant (wetting down areas of exposed coal)		
Activities	Fire Readiness Measures activated on High and Extreme and Catastrophic Risk Days	Fire Instructions – Mine (PID: 2758).
		High Risk Period Site Fire Readiness Checklist and Plan (PID: 55855 and 55854) and Extreme and Catastrophic Risk Period Site Fire Readiness Checklist and Plan (PID: 55859 and 55856)
	Fire Readiness Notification to relevant Regulators on High and Extreme and Catastrophic Risk Days	High Risk Period Site Fire Readiness Checklist and Plan (PID: 55855 and 55854) and Extreme and Catastrophic Risk Period Site Fire Readiness Checklist and Plan (PID: 55859 and 55856)
	Annual aerial photo / plan to establish adequate / appropriate spray coverage	Pre-Fire Season Checklist (PID: 36549).
	Annual Fire Awareness Training	Mine Fire Awareness Assessment Tool (PID: 51095).
	Fire Management System - Report on status of the fire service network	Fire Readiness Planning Guidelines (PID: 36546)
	Weekly Pump Inspection	Weekly Pump Inspection (PID: 51770).
	Monthly Fire Fighting Equipment Inventory & Inspection	Monthly Fire Fighting Equipment Inventory & Inspection (PID: 51849).
	Annual (Preliminary & Final) Fire Fighting Equipment Inventory & Inspection	Annual Fire Fighting Equipment Inventory & Inspection (PID: 51848).
	Compliance with hydraulic modelling design of fire service mains network	Hydraulic model records.
	Monitoring of current weather events and conditions	Weather Alerts (PID:49058)
Verification Process	Documented records for Mine Fire Awareness training.	Human Resources
	Documented fire readiness measures, resource allocation and actions (e.g. distribution) as per plans and severe and extreme days.	Mine Services Superintendent
	Records of all inspections and inventories.	Mine Services Superintendent

Fire Services – Fire protection of exposed coal and mechanical plant (wetting down areas of exposed coal)		
	Auditing of fire equipment as per the respective schedule	Mine Services Superintendent
	Annual aerial photo / plan and reviewed.	Mine Services Superintendent
	Routine inspections by regulators (entry reports / annual audits)	Hazelwood - Technical Services Manager.
Target Performance	90% of Mine employees and contractors trained in Mine Fire Awareness Training prior to Mine Declared Fire Season.	
	100% compliance with issued Fire Readiness Plans.	
	100% availability of the fire suppression system for wetting down of specific areas of the mine as per the policy	
	Aerial photo / plan completed.	
	100% Completion of Inspections and audits by set date	
Trigger for shutdown, review or investigation	Major non-conformance of above activities and target performance.	
	2 month overrun of inspections or audit	
	Fire Readiness Plan not distributed	
	Aerial photo/plan review not completed	
	Fire service system failed to meet coverage requirements during operation/testing	
	Major fire onsite with potential to impact upon the environment, public safety and business.	
Effectiveness and Elevation	Continual use on a daily basis showing effectiveness against performance requirements, especially on Mine High and Extreme and Catastrophic fire readiness days	
	Fire Management System - Weekly Status Report (RAG Report), goes to Weekly Hazelwood Rehabilitation Project Management Meeting.	
	Failures or non-conformances and identification of 2 or more ‘High Risk’ items on the Fire Management System - Weekly Status Report would be raised with the Hazelwood Rehabilitation Project Director.	

Activate Emergency Response Plan		
Responsible Officer	Hazelwood Services Superintendent	
Link to bowtie analysis / risk assessment	Historically having effective emergency response resources onsite early on in the event will reduce the severity / impact of the event and reduce the impact on public safety and the environment.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Flammable material or fuel storage fire	
	RMP Outcome: Ash and smoke pollution to environment (environmental contamination event)	
	RMP Outcome: Damage to critical power supply infrastructure leading to outage (services provided by infrastructure)	
	RMP Outcome: Health effects on sensitive receptors (public health and safety)	
	RMP Outcome: Injury of member of public on or off site (public health and safety)	
	MMH Outcome: Collapse / Loss of Consciousness (Heat, expose, lack of oxygen)	
	MMH Outcome: Emissions impacting health on-site (including CO, CO2, smoke, ash)	
	MMH Outcome: Injury or fatality of personnel	
	MMH Outcome: Interruption to employee/contractor access to site	
	MMH Outcome: Entrapment (building, vehicle, plant)	
	Coal fire due to an external running fire entering the mine onto coal surface(s)	Coal fire due to an external ember attack
	Vegetation fire	Coal fire caused by internal fire
	Unauthorised access of member of public into site	Malicious acts or arson on site
Critical Control	Activation of Emergency Response Plan – Hazelwood Project (Paradigm Doc ID: 55545) to put in place, effective emergency control for the management of events, to minimise impact to the environment, public safety and business. This is a critical control for addressing mine fire and malicious or related events	
Specific Objectives	When the Emergency Response Plan – Hazelwood Project (Paradigm Doc ID: 55545) is activated, there will be:	
	An Emergency Command and control structure to effectively manage the event within one hour	
	Suitably qualified people to address the nature of the event and to mitigate the consequences	
Performance Requirements	The site Emergency Commander will initiate the initial emergency response until relieved by the rostered ‘On Call’ Emergency Commander	
	Limit the impact on public safety and the environment from an event.	
	Only personnel that have received training in accordance with Section 11 of the Emergency Response Plan will act as an Emergency Commander.	
	Prepositioning of a command structure for anticipated events, for example fire preparedness on days of extreme fire risk.	
	The Emergency Commander will:	
	- Manage the initial emergency event	
	- Ensure that appropriate emergency services agencies have been notified, if required	

Activate Emergency Response Plan		
	- Further co-ordinate the resources necessary to combat the emergency	
	- Manage the interface if external emergency services are brought onto site	

Activate Emergency Response Plan		
Activities	Conduct at least one scheduled emergency exercise per year	Exercise Plan Procedure (PID: 51666).
	Upon declaration of an Emergency Implement Significant Issue Management Response Team	Emergency Response Plan – Hazelwood Project (PID: 55545)
	Resources allocated for critical roles in emergency management team Ensure a trained and competent person available 24/7	Emergency Response Plan – Hazelwood Project (PID: 55545).
		Fire Instructions - Mine (PID: 2758).
		Availability Roster (EC & ESLO) & Nominated EMLO's.
		Weekly Availability Roster.
	Trained & Competent Personnel – AIIMS Level 2 100% compliance with training and competency requirements	Emergency Response Plan – Hazelwood Project (PID: 55545).
Verification Process	Emergency Exercise Records audited once a year.	Site Security and Emergency Services Manager
	Emergency Exercise and/or Events debriefings. Compliance to a one-hour response time.	Site Security and Emergency Services Manager
	Emergency Exercise debriefings. Learnings go into internal incident management system INX to be tracked and actioned.	Site Security and Emergency Services Manager
	Weekly Availability Roster to confirm nominated officers for emergency commander and ESLO are available	Site Security and Emergency Services Manager
	Training Records (AIIMS). Personnel tested annually in competency through participation in emergency exercises and events.	Site Security and Emergency Services Manager
Target Performance	100% of the time when an event occurs there will be an initiated response, appropriate to the event, that will lead to the effective management of the event within one hour.	
	All nominated Emergency Commanders and ESLOs are AIIMS Level 2 incident controller qualified.	
	100% compliance with Emergency Exercise Schedule	
Trigger for shutdown, review or	External agencies cannot respond - call in of all available resources to respond to event or activation of Mutual Aid Group (CGEIG)	

Activate Emergency Response Plan	
investigation	Learnings from Emergency Exercises and/or Events go into internal incident management system INX to be tracked and actioned.
	Any failure identified during activation of the Emergency Response Plan
	One incident occurs where an AIIMS Level 2 incident controller is not available - contact next available trained and competent officer
	No emergency exercises occur in the year - analysis and investigation by the Mine Director of non-compliance of Emergency Exercise Schedule and planning for additional exercises.

Activate Emergency Response Plan	
Effectiveness and Escalation	No breach of the site security since 2010
	Emergency Response Plan was activated in 2014. Learnings and improvements from the 2014 activation include: • All nominated Emergency Commanders and ESLOs are AIIMS Level 2 incident controller qualified. • Resources allocated for critical roles in emergency management team Ensure a trained and competent person available 24/7 • Exercises are now designed, constructed and implemented under Emergency Management Australia Guidelines • Post 2014 fire, there have been 16 emergency exercises/ events in which no major failures of the new Emergency Response Plan were identified. • The Emergency Command Centres have been redesigned and constructed to meet AIIMS Guidelines.
	At least one scheduled emergency exercise is conducted and reviewed annually. Minutes and lessons learnt recorded, and actions assigned. Senior management participation in exercises
	Intelligence from external sources indicating an increased level of threat may lead to escalation to the Hazelwood Rehabilitation Project Director
	Failures or non-conformances to the Emergency Response Plan requirements would be raised to the Hazelwood Rehabilitation Project Director.

Activate Emergency Response Plan		
Responsible Officer	Hazelwood Rehabilitation Project Manager	
Link to bowtie analysis / risk assessment	Historically having effective emergency response resources onsite early on in the event will reduce the severity / impact of the event and reduce the impact on public safety and the environment.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Flammable material or fuel storage fire	
	RMP Outcome: Smoke pollution to environment (environmental contamination event)	
	RMP Outcome: Damage to critical power supply infrastructure leading to outage (services provided by infrastructure)	
	RMP Outcome: Health effects on sensitive receptors (public health and safety)	
	RMP Outcome: Injury of member of public on or off site (public health and safety)	
	Coal fire due to an external running fire entering the mine onto coal surface(s)	Coal fire due to an external ember attack
	Vegetation fire	Coal fire caused by internal fire
	Unauthorised access of member of public into site	Malicious acts or arson on site
Critical Control	Activation of Emergency Response Plan – Hazelwood Project (Paradigm Doc ID: 55545) to put in place, effective emergency control for the management of events, to minimise impact to the environment, public safety and business. This is a critical control for addressing mine fire and malicious or related events	
Specific Objectives	When the Emergency Response Plan – Hazelwood Project (Paradigm Doc ID: 55545) is activated there will be:	
	Suitably qualified people to address the nature of the event and to mitigate the consequences	
Performance Requirements	The site Emergency Commander will initiate the initial emergency response.	
	Limit the impact on public safety and the environment from an event.	
	Only personnel that have received training in accordance with Section 11 of the Emergency Response Plan will act as an Emergency Commander.	
	The Emergency Commander will:	
	- Manage the initial emergency event	
	- Ensure that appropriate emergency services agencies have been notified, if required	
	- Further co-ordinate the resources necessary to combat the emergency	
	- Manage the interface if external emergency services are brought onto site	
Activities	Upon declaration of an Emergency Implement Significant Issue Management Response Team	Emergency Response Plan – Hazelwood Project (PID: 55545)
	Resources allocated for critical roles in emergency management team	Emergency Response Plan – Hazelwood Project (PID: 55545).
		Availability Roster (EC & ESLO) & Nominated EMLO's.

Activate Emergency Response Plan		
	Ensure a trained and competent person available 24/7	Weekly Availability Roster.
Activities	Trained & Competent Personnel – AIIMS Level 2 100% compliance with training and competency requirements	Emergency Response Plan – Hazelwood Project (PID: 55545).
Verification Process	Emergency Exercise and/or Events debriefings. Compliance to a one hour response time.	Hazelwood Rehabilitation Project Manager
	Weekly Availability Roster to confirm nominated officers for emergency commander and ESLO are available	Hazelwood Rehabilitation Project Manager
	Training Records (AIIMS). Personnel tested annually in competency through participation in emergency exercises and events.	Hazelwood Rehabilitation Project Manager
Target Performance	100% of the time when an event occurs there will be an initiated response, appropriate to the event, that will lead to the effective management of the event within one hour.	
	All nominated Emergency Commanders and ESLOs are AIIMS Level 2 incident controller qualified.	
Trigger for shutdown, review or investigation	External agencies cannot respond - call in of all available resources to respond to event or activation of Mutual Aid Group (CGEIG)	
	Any failure identified during activation of the Emergency Response Plan	
	One incident occurs where an AIIMS Level 2 incident controller is not available - contact next available trained and competent officer	
Effectiveness and Escalation	Intelligence from external sources indicating an increased level of threat may lead to escalation to the Hazelwood Rehabilitation Project Steering Committee.	
	Failures or non-conformances to the Emergency Response Plan requirements would be raised to the Hazelwood Rehabilitation Project Steering Committee.	

Aquifer Depressurisation – Active Rehabilitation		
Responsible Owner	Hazelwood Technical Services Manager	
Link to bowtie analysis / risk assessment	Historically it has been proven that without planned and effective aquifer depressurisation the mine floor buckles / heaves and causes subsequent batter instability. This potential cause applies and continues to be a threat during the rehabilitation and closure stages.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: High aquifer pressures	
	Threat: Operational activities associated with rehabilitation	
	Threat: Unmanaged or uncontrolled mine lake filling	
	Unplanned or differential ground movement	Uncontrolled floor heave due to loss of weight balance
	Poor pit lake water quality entering M1 aquifer	Poor pit lake water quality entering M2 aquifer
Control Objective	Ensure bore pumps and supporting infrastructure are planned, installed, operated and managed as to: • Maintain M1 aquifer pressures below Trigger Level set at 5 m below weight balance • Maintain M2A to M2B aquifer pressures below Trigger Level set at 10 m below weight balance • Maintain M2C to M2E aquifer pressures below Trigger Level set at 20 m below weight balance.	
Performance Requirements	The M1 and M2 aquifer pump bore network has the capacity to maintain the aquifer pressures below the required Trigger Levels across the mine area.	
	Long term hydrogeological modelling to assist hydrogeological planning including aquifer responses to groundwater pumping, planned pump bore decommissioning and mine water level rise and identify key monitoring locations.	
	Aquifer pump bores performance monitored via telemetry SCADA system	
	Technicians are competent in monitoring and maintenance of the aquifer monitoring bores.	
Activities	Planning, commissioning and maintenance of M1 and M2 pump bores is undertaken to maintain M1 and M2 aquifer pressures below Trigger Levels. Shutdown and decommissioning pump bores in accordance with planned schedule.	Hydrogeology Management Plan (PID 53213)
		Activity plan for drilling a pilot bore (PID 52176)
		Pump bore installation (PID 52215) / Minimum Construction Requirements for Water Bores
		Decommissioning of boreholes (PID 55387) / Minimum Construction Requirements for Water Bores.
	Installation and maintenance of M1 and M2 aquifer groundwater monitoring networks	Installation of replacement vibrating wire piezometers as required (PID 53064)
		Sealing and decommissioning of all standpipe type bores (PID 55387) prior to inundation by rising mine water level.
		Extension of VWP monitoring cables in accordance with rising mine water levels.
	Technician is trained by Geotechnical Engineer and Hydrogeologist.	Mine stability technician competency checklist (PID 54334)

Aquifer Depressurisation – Active Rehabilitation		
	Stability Technicians undertake bore operations and monitoring as per GCMP monitoring program.	Ground Water Monitoring Procedure – Collector ArcGIS and Survey123 (PID: 57977)
		Groundwater Monitoring Procedure – Reading a Vibrating Wire Piezometer and Standpipe (PID: 57944)
		Real Time Telemetry and datalogger management (PID 57976)
	Mine water level monitoring	Weekly monitoring of mine water level. (PID 53135)
	Implementation of TARP in response to initiating events by Geotechnical Engineer	TARP Aquifer Depressurisation (PID 53283)
	Monthly and 6 Monthly Reporting of aquifer levels by Geotechnical Engineer	Hydrogeology Management Plan (PID 53213)
		Monthly Geotechnical and Hydrogeological Report
		Declared Mines Report
Verification Process	Geotechnical and Hydrogeological Report are issued Monitoring	Hazelwood Technical Services Manager
	Declared Mines Report is issued each 6 months	Hazelwood Technical Services Manager
	Update groundwater modelling	Aquifer pressures and mine water levels updated in groundwater model to prediction long term recovery of aquifer pressures relative to TL1 values.
	Documented training of Stability Technician by Geotechnical Engineer and Hydrogeologist.	Human Resources
	Geotechnical Engineer and Hydrogeologist are appropriately qualified.	Human Resources
	Monthly monitoring records are completed as per the GCMP and reviewed	Mine Geotechnical Engineer / Geologist / Senior Stability Coordinator
Target Performance	M1 aquifer pressures below TL1 100% of time	
	M2 aquifer pressures below TL1 100% of time	
	All Geotechnical and Hydrogeological Monthly and Declared Mines Reports are completed.	
	100% of personnel are trained and competent or are being supervised by someone who is trained and competent in the operation and maintenance of the aquifer monitoring instrumentation.	
Trigger for shutdown, review or investigation	Aquifer induced heave event causes mine batter movement or equipment damage.	
	Aquifer pressures exceeding TL2 in mine area	
	1 x month of monitoring data is not captured.	
	1 x month of Geotechnical and Hydrogeological Reporting is not completed.	
Effectiveness and Escalation	Aquifer pressures exceeding TL3 in mine area	
	Aquifer induced heave event(s) causes mine batter movement or significant monitoring equipment damage.	
	2 x months of Geotechnical and Hydrogeological Reporting is not completed, Hazelwood Technical Services Manager raise with Hazelwood Rehabilitation Project Director.	

Aquifer Depressurisation		
Responsible Owner	Hazelwood Rehabilitation Project Manager	
Link to bowtie analysis / risk assessment	Historically it has been proven that without planned and effective aquifer depressurisation the mine floor buckles / heaves and causes subsequent batter instability. This potential cause applies and continues to be a threat during the rehabilitation and closure stages.	
	Unplanned or differential ground movement	Uncontrolled floor heave due to loss of weight balance
	Poor pit lake water quality entering M1 aquifer	Poor pit lake water quality entering M2 aquifer
Control Objective	Mine water levels at RL 45 m AHD and key M1 and M2 aquifer pump bores decommissioned. Monitor recovery of aquifer pressures to show: • M1 aquifer pressures remain below Trigger Level set at 5 m below weight balance • M2A to M2B aquifer pressures remain below Trigger Level set at 10 m below weight balance • M2C to M2E aquifer pressures remain below Trigger Level set at 20 m below weight balance. In order to provide a level of risk management and retain the ability to utilise aquifer water to 'top-up' the mine lake, some M2 and possibly M1 pump bores will remain as well as their supporting electrical infrastructure.	
Performance Requirements	M1 and M2 aquifer groundwater monitoring network suitable for assessing aquifer recovery in groundwater levels across mine area.	
	Long term hydrogeological modelling to predict aquifer pressure recovery relative to TL1 values following pump bore decommissioning and identify key monitoring locations.	
	Technicians are competent in monitoring of the aquifer monitoring bores.	
Activities	Decommissioning of M1 and M2 pump bores and observation bores no longer required.	Decommissioning of boreholes (PID 55387) / Minimum Construction Requirements for Water Bores.
	Maintenance of M1 and M2 aquifer groundwater monitoring networks	Installation of replacement vibrating wire piezometers as required (PID 53064)
	Stability Technicians is trained and undertakes monitoring as per monitoring program.	Mine stability technician competency checklist (PID 54334)
		Ground Water Monitoring Procedure – Collector ArcGIS and Survey123 (PID: 57977)
		Groundwater Monitoring Procedure – Reading a Vibrating Wire Piezometer and Standpipe (PID: 57944)
		Real Time Telemetry and datalogger management (PID 57976)
	Mine water level monitoring	Monitoring of mine water level. (PID 53135)
	Reporting of aquifer levels by Geotechnical Engineer / Hydrogeologist	Comparison of aquifer pressure surfaces relative to TL1 surfaces as required by Hydrogeology Management Plan (PID 53213)
		Comparison of aquifer pressure recovery to groundwater model predictions.
	Implementation of TARP in response to initiating events by Geotechnical Engineer	TARP Aquifer Depressurisation (PID 53283)

Verification Process	Geotechnical and Hydrogeological Report are issued as required.	Hazelwood Rehabilitation Project Manager
	Groundwater verification modelling	Monitored aquifer recovering data updated in groundwater model to verify model predictions.
	Documented training of Stability Technician by Geotechnical Engineer and Hydrogeologist.	Human Resources
	Geotechnical Engineer and Hydrogeologist are appropriately qualified.	Human Resources
	Monitoring records are completed as per the requirements and reviewed	Mine Geotechnical Engineer / Geologist / Senior Stability Coordinator
Target Performance	M1 aquifer pressures below TL1 100% of time	
	M2 aquifer pressures below TL1 100% of time	
	All Geotechnical and Hydrogeological Reports are completed as required	
	100% of personnel are trained and competent or are being supervised by someone who is trained and competent in the operation and maintenance of the aquifer monitoring instrumentation.	
Trigger for shutdown, review or investigation	Aquifer induced heave event causes mine batter movement or monitoring equipment damage.	
	Aquifer pressure exceeding TARP TL2 in mine area due to reduced TL1 values from low mine water levels or high aquifer pressures	
	Monitoring data is not captured according to schedule.	
	Geotechnical and Hydrogeological Reporting is not completed according to schedule.	
Effectiveness and Escalation	Recovery of aquifer pressures greater than predicted or sustained low mine water levels reducing TL1 values, resulting in a TARP TL3 exceedance.	
	Aquifer induced heave event(s) causes mine batter movement or significant monitoring equipment damage.	
	2 x GCMP time stipulated Geotechnical and Hydrogeological Reports are not completed, Hazelwood Rehabilitation Project Manager to raise with Hazelwood Rehabilitation Project Steering Committee.	

Design - Geometry of Batters, Benches, Embankment and Rehabilitation Design		
Responsible Officer	Hazelwood Technical Services Manager	
Link to bowtie analysis / risk assessment	Historically it has been proven that correct design of the geometry of batters, benches and embankments within the mine will limit the frequency of mine floor or mine batter instability events or water inundation from external water sources.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Inadequate design / implementation of mine rehabilitation / surcharge dump	
	Threat: Mine uncontrollably inundated by large volume of external water	
	Threat: Operational activities associated with rehabilitation	
	Threat: Seismic event	
	Threat: Unfavourable Geology	
	Threat: Unmanaged or uncontrolled mine lake filling	
	Erosion leading to degradation of rehabilitated batters	Erosion
	Slope failure of overburden dump	Unplanned or differential ground movement
	Uncontrolled floor heave	EPA Licensed landfills (ash, hard rubbish & asbestos landfill) loss of containment and seepage
	Poor water quality in run off from EOD, including dispersive soils	
Critical Control	This is a human activity critical control. The human activity is analysis of geotechnical conditions (such as shear strength parameters, long term water levels, geotechnical interfaces, geological structure locations, etc) by geotechnical engineers to develop a suitable design which is then reviewed by an independent geotechnical engineer for the high consequence events.	
Specific Objectives	To create an acceptable performance-based design that is based on and appropriate for the specific rehabilitation domain conditions, as well as risk profile (e.g. internal or adjacent critical infrastructure). With appropriate supporting controls in place the design achieves the intended function and performance.	
Performance Requirements	The requirements are to achieve an acceptable performance-based design that provides for the integrity of the mine batters (including rehabilitated batters), benches and embankments, achieving satisfactory batter performance and effective implementation of associated procedures and processes.	
	The design is complemented by the critical controls Aquifer Depressurisation (103) and Horizontal Boreholes (231) and verified by monthly monitoring (601), inspections (245) and reporting. Geotechnical Engineer is appropriately qualified	
Activities	Geotechnical investigations, assessment and modelling by Geotechnical Engineer	Defect mapping (PID 52113)
		Geological logging (overburden) (PID 52178)
		Geotechnical logging (PID 53070)
		CPT testing (PID 53206)
		DCP testing (PID 53207)

Design - Geometry of Batters, Benches, Embankment and Rehabilitation Design		
		Inclusion of new geological data into Vulcan model (PID 53209)
		Defect mapping at Hazelwood Mine for the structural geological model (PID 52113)
	Stability analyses by Geotechnical Engineer to confirm Target Factor of Safety (FoS) and / or Probability of Failure (PoF) for the specific area	Slope category 4 - 1.5 FoS Slope category 3 - 1.3 FoS Slope category 2 - 1.2 FoS Slope category 1 - 1.1 FoS
		PID 53211 – Stability Analysis
	Assessment of rehabilitation designs	Specialist analysis and design, coupled with independent peer review processes (as detailed below).
	Batter / bench / embankment design by Geotechnical Engineer	Ground control management plan (GCMP v5- 2019) (PID 56966)
		ANCOLD Guidelines (for dam wall design)
		Study and batter design reports
	Recording of activities and events by Geotechnical Engineer	S:\Groups\Mine\Engineering\Engineering\Stability Mine & Regional\Geotechnical\Databases & Models\Hazard Registry\Geotechnical Hazard Registry.xlsx\
		ENGIE Hazelwood Incident Management Reporting Procedure (PID 35510)
	Peer review of design by Senior Geotechnical Engineer	Internal review and approval processes
		External peer review processes for major designs
Verification Process	Checks of the design and 12 monthly (minimum) independent design review / checking process (including internal and external peer reviews, supported by documented evidence of reviews and approvals).	Hazelwood Technical Services Manager
	Actual batter stability performance versus design (basis and expectations) - reconciliation by Geotechnical Engineer	Hazelwood Technical Services Manager
	Monthly Geotechnical and Hydrogeological Report is issued	Hazelwood Technical Services Manager
	Geotechnical Engineer is appropriately qualified.	Human Resources
	Declared Mines Report is issued each 6 months to DEECA	Hazelwood Technical Services Manager
Target Performance	100% of design reviews yield comparable analysis outcomes and design configurations (i.e.., consistent FoS and / or PoF).	
	Probabilistic (limit equilibrium) batter stability assessments undertaken confirmed exceedance of this criteria based on execution of the designed rehabilitation measures. Finite element modelling undertaken confirms the outcomes from limit equilibrium modelling.	

Design - Geometry of Batters, Benches, Embankment and Rehabilitation Design	
	Zero major surprise stability related events or significant impacts on the business (including safety, environmental and business continuity related consequences).
	100% acceptable / tolerable batter and embankment performance at "large scale" (i.e.., > 500m3 in size or multi-batter; in line with expectations – stability and ground movement related).
	100% of new, updated or modified batter / rehabilitation and embankment designs are accompanied by a suitable design report with appropriate and clear reviews and approvals / sign-off (demonstrating sound engineering principles and due process).
	100% of personnel are trained and competent or are being supervised by someone who is trained and competent in the monitoring of geotechnical conditions.
Trigger for shutdown, review or investigation	Major batter / rehabilitation or embankment instability or failure.
	Increased frequency or pattern of small-medium scale batter instabilities and / or failures.
	Identification of unfavourable ground conditions (e.g. previously unknown geological structures or firehole presence not anticipated or sufficiently catered for in the adopted design configuration and / or management processes).
	Non-compliance of design process (and / or recommended parameters) or outcomes / recommendations identified through review and audit processes.
Effectiveness and Escalation	The effectiveness of the batter, bench and embankment design critical control is determined by the number and nature of instability / failure events experienced. In recent times no major failures (>500 m^3) have occurred, i.e. in the last 5 years, attributed to design issues.
	Reportable events are notified to DEECA and senior mine management.
	Compliance or technical engineering / analytical issues identified through 3rd party review and audit processes - Hazelwood Technical Services Manager raise with Hazelwood Rehabilitation Project Director for remedial actions.

Design - Geometry of Batters, Benches, Embankment, Levees and Rehabilitation Design		
Responsible Officer	Hazelwood Rehabilitation Project Manager	
Link to bowtie analysis / risk assessment	Historically it has been proven that correct design of the geometry of batters, benches, embankments and rehabilitation areas within the mine will limit the frequency of mine floor or mine batter instability events.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Inadequate design / implementation of mine rehabilitation / surcharge dump	
	Threat: Seismic event	
	Threat: Unfavourable Geology	
	Erosion leading to degradation of rehabilitated batters	Erosion
	Slope failure of overburden dump	Unplanned or differential ground movement
	Uncontrolled floor heave	EPA Licensed landfills (ash, hard rubbish & asbestos landfill) loss of containment and seepage
	Poor water quality in run off from EOD, including dispersive soils	
Critical Control	This is a human activity critical control. The human activity is analysis of geotechnical conditions (such as shear strength parameters, long term water levels, geotechnical interfaces, geological structure locations, etc) by geotechnical engineers to develop a suitable design which is then reviewed by an independent geotechnical engineer for the high consequence events.	
Specific Objectives	To create an acceptable performance-based design that is based on and appropriate for the specific rehabilitation domain conditions, as well as risk profile (eg. internal or adjacent critical infrastructure). With appropriate supporting controls in place the design achieves the intended function and performance.	
Performance Requirements	The requirements are to achieve an acceptable performance-based design that provides for the integrity of the mine batters (including rehabilitated batters), benches and embankments, achieving satisfactory batter performance and effective implementation of associated procedures and processes.	
	The design is complemented by the critical controls Aquifer Depressurisation (103) and Horizontal Boreholes (231) and verified by monitoring (601), inspections (245) and reporting. Geotechnical Engineer is appropriately qualified	
Activities	Geotechnical investigations, assessment and modelling by Geotechnical Engineer	Defect mapping (PID 52113)
		Geological logging (overburden) (PID 52178)
		Geological logging (bottom of coal) (PID 52212)
		Geotechnical logging (PID 53070)
		CPT testing (PID 53206)
		DCP testing (PID 53207)
		Inclusion of new geological data into Vulcan model (PID 53209)
		Defect mapping at Hazelwood Mine for the structural geological model (PID 52113)

	Stability analyses by Geotechnical Engineer to confirm Target Factor of Safety (FoS) and / or Probability of Failure (PoF) for the specific area	Slope category 4 - 1.5 FoS Slope category 3 - 1.3 FoS Slope category 2 - 1.2 FoS Slope category 1 - 1.1 FoS
		PID 53211 – Stability Analysis
	Assessment of rehabilitation designs	Specialist analysis and design, coupled with independent peer review processes (as detailed below).
	Batter / bench / embankment design by Geotechnical Engineer	Ground control management plan (GCMP v5- 2019) (PID 56966)
		ANCOLD Guidelines (for dam wall design)
		Study and batter design reports
	Recording of activities and events by Geotechnical Engineer	S:\Groups\Mine\Engineering\Engineering\Stability Mine & Regional\Geotechnical\Databases & Models\Hazard Registry\Geotechnical Hazard Registry.xlsx\
		ENGIE Hazelwood Incident Management Reporting Procedure (PID 35510)
	Peer review of design by Senior Geotechnical Engineer	Internal review and approval processes
		External peer review processes for major designs
Verification Process	Checks of the design and 12 monthly (minimum) independent design review / checking process (including internal and external peer reviews, supported by documented evidence of reviews and approvals).	Hazelwood Rehabilitation Project Manager
	Actual batter stability performance versus design (basis and expectations) - reconciliation by Geotechnical Engineer	Hazelwood Rehabilitation Project Manager
	Geotechnical and Hydrogeological Report is issued	Hazelwood Rehabilitation Project Manager
	Geotechnical Engineer is appropriately qualified.	Human Resources
	Declared Mines Report is issued each 6 months to DEECA	Hazelwood Rehabilitation Project Manager
Target Performance	100% of design reviews yield comparable analysis outcomes and design configurations (ie., consistent FoS and / or PoF)..	
	Probabilistic (limit equilibrium) batter stability assessments undertaken confirmed exceedance of this criteria based on execution of the designed rehabilitation measures. Finite element modelling undertaken confirms the outcomes from limit equilibrium modelling.	
	Zero major surprise stability related events or significant impacts on the business (including safety, environmental and business continuity related consequences).	
	100% acceptable / tolerable batter and embankment performance at "large scale" (ie., > 500m3 in size or multi-batter; in line with expectations – stability and ground movement related).	

	100% of new, updated or modified batter / rehabilitation and embankment designs are accompanied by a suitable design report with appropriate and clear reviews and approvals / sign-off (demonstrating sound engineering principles and due process).
	100% of personnel are trained and competent or are being supervised by someone who is trained and competent in the monitoring of geotechnical conditions.
Trigger for shutdown, review or investigation	Major batter / rehabilitation or embankment instability or failure.
	Increased frequency or pattern of small-medium scale batter instabilities and / or failures.
	Identification of unfavourable ground conditions (eg. previously unknown geological structures or firehole presence not anticipated or sufficiently catered for in the adopted design configuration and / or management processes).
	Non-compliance of design process (and / or recommended parameters) or outcomes / recommendations identified through review and audit processes.
Effectiveness and Escalation	The effectiveness of the batter, bench and embankment design critical control is determined by the number and nature of instability / failure events experienced. In recent times no major failures (>500 m^3) have occurred, i.e. in the last 5 years, attributed to design issues.
	Reportable events are notified to DEECA and senior mine management.
	Compliance or technical engineering / analytical issues identified through 3rd party review and audit processes - Hazelwood Rehabilitation Project Manager raise with Hazelwood Rehabilitation Project Steering Committee for remedial actions.

Horizontal Drainholes		
Responsible Officer	Hazelwood Technical Services Manager	
Link to bowtie analysis / risk assessment	Historically it has been proven that without planned and effective horizontal drains installed in the mine final batters, the water levels can rise within the mine batters causing mine batter instability.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Cracks and joints in coal allow water entry	
	Threat: High rainfall event	
	Threat: Higher than normal use of fire water suppression systems	
	Threat: Inadequate design / implementation of mine rehabilitation / surcharge dump	
	Threat: Mine uncontrollably inundated by large volume of external water	
	Threat: Significant leakage from fire service, mine filling pipes or burst main	
	Threat: Unmanaged or uncontrolled mine lake filling	
	Geotechnical instability of insitu overburden and/or coal	
Critical Control	This is a human activity and technological critical control. The human activity is planning and managing so as to ensure a sufficient number and spread of horizontal drains so as to maintain suitably low water levels in the mine final batters. The technology is the horizontal drains, which provide the water release from the mine batters.	
Specific Objectives	Ensure a suitable number and spread of horizontal drains are planned, installed and managed within the mine so as to maintain the water levels within the batters to achieve a minimum 1.1 factor of safety.	
Performance Requirements	Long term hydrogeological and geotechnical modelling is completed to identify water levels within the mines final batters that will achieve a minimum 1.1 factor of safety and a target 1.5 factor of safety.	
	Each horizontal drain has the capacity to reduce batter water levels in the area in which it is positioned.	
	Horizontal drains are installed so as to reduce the mine batter water level where the drain is positioned.	
	Technicians are competent in monitoring of the horizontal drain flows.	
	Horizontal drain operational checks are completed during periods of high rainfall.	
Activities	Assessment and design of drainhole locations (including collar coordinates, length, azimuth and inclination) by Geotechnical Engineer	Horizontal Bore Design (PID 52112)
		Defect mapping (PID 52113)
		Crack mapping (PID 53069)
		Batter groundwater level trigger report (PID 53144)
	Design, installation and commissioning of drainholes under the supervision of the Geotechnical Engineer, so as to maintain a water level within the mine batter to	Supporting Observation and Horizontal Bores and the Earthworks, Beaching and Drainage projects
		Horizontal bore installation (PID 52177)

Horizontal Drainholes		
	achieve a 1.1 factor of safety, as a minimum.	
	Stability Technician is trained by Geotechnical Engineer and/or Hydrogeologist and/or Geologist.	Water quality and flow monitoring (PID 58067)
		Rainfall data collection and management (PID 53136)
		Rainfall TARP (PID 53140)
		Stability groundwater level TARP (PID 53141)
		Area of interest monitoring (PID 50957)
		Ground control management plan (GCMP V5 2019) (PID 56966)
		Significant Inflow of Water TARP (PID XXXXX)
		Ground movement TARP (PID 56942)
		Mine stability technician competency checklist (PID 54334)

Horizontal Drainholes		
Activities Cont'	Monitoring of key drainhole flows and rainfall by the Stability Technician during high rainfall events (>20 mm/24hrs) and significant inflow of water events.	Rainfall data collection and management (PID 53136)
		Significant Inflow of Water TARP (PID XXXXX)
	Monthly groundwater level monitoring by the stability technician	Water quality and flow monitoring (PID 58067)
		Rainfall data collection and management (PID 53136)
		Rainfall TARP (PID 53140)
		Stability groundwater level TARP (PID 53141)
	Monthly ground movement monitoring by Mine Surveyors / Survey Technicians.	Area of interest monitoring (PID 50957)
		Ground control management plan (GCMP V5 2019) (PID 56966)
		Ground movement TARP (PID 56942)
	Probing of drainhole traces by Geotechnical Engineer after any relevant mine emergency event, such as fire, seismic activity, batter instability or significant inflow of water.	Ref. GH_481_R. Diagnostic inspection of horizontal drains using See Snake device – Hazelwood Mine. August 2014. Re-drilling of drainholes identified as blocked / problematic.
		Significant Inflow of Water TARP (PID XXXXX)
Verification Process	Monthly Geotechnical and Hydrogeological Report are issued	Hazelwood Technical Services Manager
	Monthly monitoring records are completed as per the GCMP and reviewed	Mine Geotechnical Engineer, Mine Stability Technician

Horizontal Drainholes		
	Documented training of Stability Technician by Geotechnical Engineers and / or Hydrogeologists and / or Geologists.	Human Resources
	Geotechnical Engineers and / or Hydrogeologists and / or Geologists are appropriately qualified.	Human Resources
	Declared Mines Report is issued each 6 months to DJPR	Hazelwood Technical Services Manager
	Batter stability studies for Rehabilitation and Closure included extreme sensitivity testing of M1 coal water gradients.	
	All Declared Mines Reports are issued as required.	
	All monthly Geotechnical and Hydrogeological Reports are completed and sent out to the Hazelwood Rehabilitation Project Team with key issues highlighted.	
	100% of time, water levels within the mine batters are above 1.1 factor of safety.	
	100% of personnel are trained and competent or are being supervised by someone who is trained and competent in recording water levels, horizontal drain flows and ground movement.	
	Critical surface movement, as defined in the TARPs (not to exceed 5mm/day over a monthly period in the Active Rehabilitation Area or 2mm/day over a monthly period in Non Active Areas.	
Trigger for shutdown, review or investigation	1 x month of Geotechnical and Hydrogeological Reporting is not completed.	
	1 x Declared Mines Report not issued.	
	Final batter movement event causes mine production loss.	
	Mine batter water levels are below a 1.1 factor of safety	
	1 x month of monitoring data is not captured.	
	Surface movement exceeds 5mm/day in Active Rehabilitation Area or 2mm/day in Non-Active Rehabilitation Areas. Real time monitoring devices installed onsite indicate no movement exceeding these targets.	
	If drainholes have been damaged, replacement should be reviewed and investigated	
	If significant change in monitoring trends is observed, review and investigation instigated	

Horizontal Drainholes	
Effectiveness and Escalation	The effectiveness of the horizontal drainhole critical control is determined by the number of horizontal drain hole induced equipment damage or related stability events.
	Historically no major mine movements or equipment damage has occurred in the last 10 years attributed to failed horizontal bores.
	2 x months of Geotechnical and Hydrogeological Reporting is not completed, Hazelwood Technical Services Manager raise with Hazelwood Rehabilitation Project Director.

Geotechnical Inspections		
Responsible Officer	Hazelwood Technical Services Manager	
Link to bowtie analysis / risk assessment	Historically it has been proven that with planned and routine Geotechnical Inspections within the mine will limit the frequency of instability events, including mine floor, mine batters, waste dumps, ash ponds and other water bearing structures, levees etc..	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Cracks and joints in coal allow water entry	Threat: Surface erosion (including wave action).
	Threat: High aquifer pressures	Threat: Unfavourable Geology
	Threat: High rainfall event	Threat: Unmanaged or uncontrolled mine lake filling
	Threat: Inadequate design / implementation of mine rehabilitation / surcharge dump	RMP Outcome - Failure of Morwell Main Drain (public health and safety)
	Threat: Mine uncontrollably inundated by large volume of external water	RMP Outcome - Impact on Community Facilities (services provided by infrastructure)
	Threat: Operational activities associated with rehabilitation	RMP Outcome - Mine Inundation (environmental contamination event)
	Threat: Seismic event	RMP Outcome - Unexpected Movement (public health and safety)
	Geotechnical instability of insitu overburden and/or coal	Ash comes in contact with water
	Erosion leading to degradation of rehabilitated batters	Infiltration of water through Morwell Main Drain (MMD)
	Erosion at shoreline	Unplanned or differential ground movement
	Erosion	Uncontrolled floor heave
	Slope failure of overburden dump	
Critical Control	This is a human activity critical control. Planned and routine Geotechnical Inspections of priority rehabilitation areas	
Specific Objectives	Identify precursor stability events within the Mine enabling preventative response actions through:	
	Geotechnical Engineer to conduct fortnightly inspections of priority rehabilitation areas.	
	Geotechnical Engineer to issue a report of findings and remedial actions to mine personnel	
	Geotechnical Engineer to conduct inspections in response to tripped TARPs.	
Performance Requirements	Geotechnical Engineer is appropriately qualified	
	Geotechnical Engineer conducts fortnightly inspections as per GCMP	
	Geotechnical Engineer issues a report of his/her inspection findings fortnightly and issues a remediation plan (outlining the actions and responsibilities)	
	Geotechnical Engineer identifies and communicates "critical" geotechnical issues to Hazelwood Technical Services Manager immediately.	

Geotechnical Inspections		
Activities	Conduct routine geotechnical inspections by Geotechnical Engineer	Area of interest monitoring (PID 50957)
		Geotechnical Hazard Identification (PD 52115)
		Dam and TSF inspections (PID 52302)
		Crack mapping (PID 53069)
	Complete Geotechnical inspection reporting by Geotechnical Engineer	Fortnightly Geotechnical Report – proforma (PID 38998)
		Formal routine inspection reporting, ad-hoc and email communications (PID 52115)
	Senior Geotechnical Engineer reviews and signs off Geotechnical Inspection Report	Formal routine inspection reporting, ad-hoc and email communications (PID 52115)
	Implementation of TARP in response to trigger events by Geotechnical Engineer	Rainfall data collection and management (PID 53136)
		Rainfall TARP (PID 53140)
		Geotechnical Hazard TARP (PID 53232)
		Stability groundwater level TARP (PID 53141)
		Ground movement TARP (PID 56942)
		Mine preparedness Plan Rainfall (PID 55263)
		Significant Inflow of Water TARP (PID XXXXX)
	Maintain record of geotechnical activities and events by Geotechnical Engineer	Ground Instability Register– ENGIE Hazelwood Incident Management Reporting Procedure (PID 35510)
	Conduct operational personnel training and mentoring by Geotechnical Engineer	Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		GCMP Awareness Training to Operators
		Continuing Professional Development processes
Verification Process	Fortnightly inspection results and required remedial actions reported	Mine Technical Services Team.
	Monthly Geotechnical and Hydrogeological Report is issued	Hazelwood Technical Services Manager
	Declared Mines Report is issued each 6 months to DEECA	Hazelwood Technical Services Manager
	Geotechnical Engineer is appropriately qualified.	Human Resources
Target Performance	100% of fortnightly geotechnical inspections completed and report of findings generated.	
	100% of TARPs response completed.	
	All monthly Geotechnical and Hydrogeological Reports are completed and sent out to the Hazelwood Rehabilitation Project Team with key issues highlighted.	

	Database of Geotechnical Incidents is maintained.
	Items identified as "critical" are reported and actioned.
	100% of personnel are trained and competent or are being supervised by someone who is trained and competent in conducting geotechnical inspections.
Trigger for shutdown, review or investigation	Critical surface movement, as defined in the TARPs (Section 7.7.1.4 of the GCMP), not to exceed 5mm/day over a monthly period in the Active Rehabilitation Area or 2mm/day over a monthly period in Non-Active Areas.
	Items identified as "critical" are not reported / missed and are not actioned within the allotted timeframe
	1 fortnight of missing inspection reports
Effectiveness and Escalation	The effectiveness of the geotechnical inspection critical control is determined by the number stability events it is able to "foresee" at early development stage.
	Historically stability events have been detected within the Mine enabling preventative response actions.
	2 x months of Geotechnical and Hydrogeological Reporting is not completed, Hazelwood Technical Services Manager raise with Hazelwood Rehabilitation Project Director.

Geotechnical Inspections *(Inc. MMD redesign)*		
Responsible Officer	Hazelwood Rehabilitation Project Manager	
Link to bowtie analysis / risk assessment	Historically it has been proven that with planned and routine Geotechnical Inspections within the mine will limit the frequency of instability events, including mine floor, mine batters, waste dumps, ash ponds and other water bearing structures, levees etc..	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Cracks and joints in coal allow water entry	Threat: Surface erosion (including wave action).
	Threat: High aquifer pressures	Threat: Unfavourable Geology
	Threat: High rainfall event	RMP Outcome - Failure of Morwell Main Drain (public health and safety)
	RMP Outcome - Impact on Community Facilities (services provided by infrastructure)	RMP Outcome - Unexpected Movement (public health and safety)
	Threat: Seismic event	Slope failure of overburden dump
	Geotechnical instability of insitu overburden and/or coal	Ash comes in contact with water
	Erosion leading to degradation of rehabilitated batters	Infiltration of water through Morwell Main Drain (MMD)
	Erosion at shoreline	Unplanned or differential ground movement
	Erosion	Uncontrolled floor heave
Critical Control	This is a human activity critical control. Planned and routine Geotechnical Inspections of the rehabilitated mine, surrounds and redesigned MMD.	
Specific Objectives	Identify precursor stability events within the Mine enabling preventative response actions through:	
	Geotechnical Engineer to conduct monthly inspections of priority rehabilitation areas.	
	Geotechnical Engineer to issue a report of findings and remedial actions to project personnel	
	Geotechnical Engineer to conduct inspections in response to tripped TARPs.	
Performance Requirements	Geotechnical Engineer is appropriately qualified	
	Geotechnical Engineer conducts two-monthly inspections as per GCMP	
	Geotechnical Engineer issues a report of his/her inspection findings and issues a remediation plan (outlining the actions and responsibilities)	
	Geotechnical Engineer identifies and communicates "critical" geotechnical issues to Hazelwood Project Manager immediately.	
Activities	Conduct routine geotechnical inspections by Geotechnical Engineer	Area of interest monitoring (PID 50957)
		Geotechnical Hazard Identification (PD 52115)
		Dam and TSF inspections (PID 52302)
		Crack mapping (PID 53069)
	Complete Geotechnical inspection reporting by Geotechnical Engineer	Geotechnical Report – proforma (PID 38998)

		Formal routine inspection reporting, ad-hoc and email communications (PID 52115)
	Senior Geotechnical Engineer reviews and signs off Geotechnical Inspection Report	Formal routine inspection reporting, ad-hoc and email communications (PID 52115)
	Implementation of TARP in response to trigger events by Geotechnical Engineer	Rainfall data collection and management (PID 53136)
		Rainfall TARP (PID 53140)
		Geotechnical Hazard TARP (PID 53232)
		Ground movement TARP (PID 56942)
	Maintain record of geotechnical activities and events by Geotechnical Engineer	Ground Instability Register– ENGIE Hazelwood Incident Management Reporting Procedure (PID 35510)
	Conduct operational personnel training and mentoring by Geotechnical Engineer	Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		GCMP Awareness Training to project personnel.
Verification Process	Iinspection results and required remedial actions reported	Hazelwood Rehabilitation Project Team.
	Geotechnical and Hydrogeological Report is issued	Hazelwood Rehabilitation Project Manager
	Declared Mines Report is issued to DEECA	Hazelwood Rehabilitation Project Manager
	Geotechnical Engineer is appropriately qualified.	Hazelwood Rehabilitation Project Manager
Target Performance	100% of geotechnical inspections completed and report of findings generated.	
	100% of TARPs response completed.	
	All Geotechnical and Hydrogeological Reports are completed and sent out to the Hazelwood Rehabilitation Project Team with key issues highlighted.	
	Database of Geotechnical Incidents is maintained.	
	Items identified as "critical" are reported and actioned.	
	100% of personnel are trained and competent or are being supervised by someone who is trained and competent in conducting geotechnical inspections.	
Trigger for shutdown, review or investigation	Critical surface movement, not to exceed that as defined in the TARPs.	
	Items identified as "critical" are not reported / missed and are not actioned within the allotted timeframe.	
Effectiveness and Escalation	The effectiveness of the geotechnical inspection critical control is determined by the number stability events it is able to "foresee" at early development stage.	
	Historically stability events have been detected within the Mine enabling preventative response actions.	
	2 x GCMP time stipulated Geotechnical Inspections are not completed, issue is raised with Hazelwood Rehabilitation Project Manager.	

Operation and Maintenance of the MMD Channel and Low Flow Pipe		
Responsible Officer	Hazelwood Technical Services Manager	
Link to bowtie analysis / risk assessment	A failure of the Low Flow Pipe and Morwell Main Drain (MMD) channel in 2011 demonstrated that without the correct management of this asset it has the ability to cause batter instability in the East Field Northern Batter, the batter with very close proximity to the public and significant public and private infrastructure. This control would prevent large volumes of Morwell township run off water to travel into coal cracks and cause mine batter instability.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Cracks and joints in coal allow water entry	
	Threat: Mine uncontrollably inundated by large volume of external water	
	Geotechnical instability of insitu overburden and/or coal	Infiltration of water through Morwell Main Drain (MMD)
Critical Control	This is a human activity and technological critical control. The human activity is managing the functionality of the low flow pipe and MMD. The technology is the instrumentation used to monitor the low flow pipe and MMD, which provides the conduit for water to be directed away from the mine batters.	
Specific Objectives	The functionality of the existing MMD and low flow pipe is maintained by inspection and maintenance as per the Operations and Maintenance (O&M) manual.	
Performance Requirements	MMD and low flow pipe transports all Morwell township run off water away from the mine batters.	
	Geotechnical Engineers competent in monitoring performance of low flow pipe and MMD channel.	
	Low flow pipe and MMD are inspected during periods of high rainfall to confirm that Morwell Township water volumes are being transported away from the mine batters.	
Activities	Monthly inspections of wall and main drain by Geotechnical Engineer	MMD O&M Manual (PID 50355)
		Geotechnical Hazard Identification (PD 52115)
	Monitoring of MMD and low flow pipe flows and rainfall by the Geotechnical Engineer during high rainfall events (>30 mm/24hrs).	Rainfall data collection and management (PID 53136)
	Monthly reporting (observations and actions) by Geotechnical Engineer	Monthly Geotechnical Reporting (PID 52115)
	Implementation of TARP in response to trigger events by Geotechnical Engineer	In line with formal inspection process (monthly routine, and > 30 mm rain within 24 hours)
		Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		Rainfall TARP (PID 53140)
		Stability groundwater level TARP (PID 53141)
		Ground movement TARP (PID 56942)
		Significant Inflow of Water (PID XXXXX)
		Water quality and flow monitoring (PID 58067)
		Rainfall data collection and management (PID 53136)
		Mine Preparedness Plan Rainfall (PID 55263)

Operation and Maintenance of the MMD Channel and Low Flow Pipe		
Activities Cont'	Monthly ground movement monitoring by Mine Surveyors / Survey Technicians, extensometers and inclinometers by Stability Technician	Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		Inclinometer readings manual (PID 57978)
		Reading vertical displacement from an extensometer (PID 53067)
		Total station survey monitoring procedure (PID 55119)
		General survey (PID 53135)
		Reading horizontal displacement from an extensometer (PID 53178)
		Standard Work Procedure Monitoring of Ground Movement through extensometer (PID 55185)
	Maintenance of MMD and low flow pipe completed as directed by Geotechnical Engineer	MMD O&M Manual (PID 50355)
		Calibration of Flowdar – Maximo compliance routine (Maximo 8820)
	Low flow pipe Flowdar – measures flow within low flow pipe (reported during monthly MMD inspection by Geotechnical Engineer).	Rainfall TARP (PID 53140)
		Water quality and flow monitoring (PID 58067)
		Standard Work Procedure low flow pipe Flowdar and main channel Flowdar (PID 55184)
	Main channel Flowdar – measures flow within main drain (reported during monthly MMD inspection by Geotechnical Engineer)	Rainfall TARP (PID 53140)
		Water quality and flow monitoring (PID 58067)
		Standard Work Procedure low flow pipe Flowdar and main channel Flowdar (PID 55184)
Verification Process	Geotechnical Engineer is appropriately qualified	Human Resources
	Monthly Inspection and high rainfall inspections records are reported / documented and checked	Senior Geotechnical Engineer
	Mine Surveyors / Survey Technicians are appropriately experienced or qualified	Human Resources
	Documented training of Stability Technician by Geotechnical Engineers and / or Hydrogeologists and / or Geologists.	Human Resources
	Records of the completion of remedial actions	Senior Geotechnical Engineer
Target Performance	100% of personnel are trained and competent or are being supervised by someone who is trained and competent in the use of the MMD monitoring equipment.	
	100% of monthly and high rainfall event inspections completed.	
	100% of TARPs response completed.	

Operation and Maintenance of the MMD Channel and Low Flow Pipe	
	Extreme case sensitivity assessments were undertaken involving the testing of elevated (full) coal joint water levels, these results were incorporated into the TARP thresholds.
	Maintenance of MMD is completed as directed by Geotechnical Engineer.
	Surface movement in the area of the MMD not to exceed TARP levels over a monthly period in Non-Active Rehabilitation Areas
Trigger for shutdown, review or investigation	1 x month of MMD Reporting is not completed.
	1 x month of monitoring data is not captured.
	Water levels within mine batters are high enough so as to cause a drop in the factor of safety of the mine batters below 1.1.
	Visible loss of water from MMD or low flow pipe
	Critical surface movement, as defined in the TARPs not to exceed TARP levels over a monthly period in Non-Active Rehabilitation Areas.
Effectiveness and Escalation	The effectiveness of the low flow pipe and MMD critical control has been demonstrated by no failure or related ground instability events since the 2012 repair.
	2 x months of MMD Reporting is not completed, Hazelwood Technical Services Manager raise with Hazelwood Rehabilitation Project Director.
	To eliminate this hazard the highest level of control is removal. In order to achieve this all Morwell Township water currently entering the MMD and low flow pipe are planned to be redirected into the Hazelwood Mine Lake.

Monitoring of ground movement and hydrogeological conditions by instrumentation		
Responsible Officer	Hazelwood Technical Services Manager	
Link to bowtie analysis / risk assessment	Historically it has been proven that planned and effective monitoring of ground movement and hydrogeological conditions within the mine will limit the frequency of instability events, including mine floor, mine batters, waste dumps, ash ponds and other water bearing structures, levees, etc.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Cracks and joints in coal allow water entry	Threat: Seismic event
	Threat: High aquifer pressures	Threat: Significant leakage from fire service, mine filling pipes or burst main
	Threat: High rainfall event	Threat: Unmanaged or uncontrolled mine lake filling
	Threat: Higher than normal use of fire water suppression systems	RMP Outcome - Failure of Morwell Main Drain (public health and safety)
	Threat: Inadequate design / implementation of mine rehabilitation / surcharge dump	RMP Outcome - Mine Inundation (environmental contamination event)
	Threat: Mine uncontrollably inundated by large volume of external water	RMP Outcome - Unexpected Movement (public health and safety)
	Threat: Operational activities associated with rehabilitation	RMP Outcome - Impact on Community Facilities (services provided by infrastructure)
	Geotechnical instability of insitu overburden and/or coal	Ash comes in contact with water
	Erosion leading to degradation of rehabilitated batters	Infiltration of water through Morwell Main Drain (MMD)
	Erosion at shoreline	Unplanned or differential ground movement
	Uncontrolled floor heave	Dams and water retaining structure failure
	Extreme rainfall event resulting in overtopping of pit lake	Poor pit lake water quality entering M2 aquifer
	Poor pit lake water quality entering M1 aquifer	Slope failure of overburden dump
	Erosion	
Critical Control	This is a human activity and technological critical control. The human activity is planning and managing so as to ensure a sufficient number and spread of monitoring instrumentation to monitor ground movement and hydrogeological conditions within and around the mine. The technology is the monitoring instrumentation, which provides the core data and with the move to additional real time monitoring, is envisaged (via Citect) to provide a higher level of automation in response to Trigger events.	

Monitoring of ground movement and hydrogeological conditions by instrumentation		
Specific Objectives	Provide a suitable number and spread of monitoring instrumentation is installed and managed within the mine. Routinely monitor ground movement (including erosion), hydrogeological conditions and mine lake water fill rates as per the GCMP and TARPs.	
Performance Requirements	Suitable and functional equipment is designed and installed to monitor ground movement (including erosion), hydrogeological conditions and mine lake water fill rates.	
	Suitable and functional equipment is maintained to monitor ground movement (including erosion), hydrogeological conditions and mine lake level water fill rates.	
	Each monitoring instrument is capable of measuring either ground movement (including erosion), water levels within the batters, aquifer levels below the mine and mine lake water fill rates.	
	Mine Surveyors / Survey Technicians are appropriately experienced or qualified.	
	Stability Technicians are competent in monitoring of the hydrogeological monitoring bores.	
	1 x 7 Services Supervisor, 1 x 7 Crews, Stability Technicians and Geotechnical Engineers and / or Hydrogeologists and / or Geologists are competent in the use of Citect.	
	Geotechnical Engineers and / or Hydrogeologists and / or Geologists are appropriately qualified.	
Activities	Planning, installation and commissioning of monitoring equipment is undertaken under the supervision of the Geotechnical Engineers and / or Hydrogeologists and / or Geologists and / or GIS / Spatial Coordinator.	Hydrogeology Management Plan (PID 53213)
		Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		Activity plan for drilling a pilot bore (PID 52176)
		Installation of vibrating wire piezometers and standpipes in a borehole (PID 53064)
	Stability Technicians and Mine Surveyors / Survey Technicians undertake monitoring as per GCMP monitoring program.	Vibrating wire piezometer and standpipe monitoring (PID 57944)
		Area of interest monitoring (PID 50957)
		Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		Continuous GNSS / Citect Monitoring System Overview (PID 54335)
		Groundwater Monitoring using a Juno (PID 53131)
		Inclinometer readings manual (PID 57978)
		Water quality and flow monitoring (PID 58067)
		Reading vertical displacement from an extensometer (PID 53067)

Monitoring of ground movement and hydrogeological conditions by instrumentation		
		Reading horizontal displacement from an extensometer (PID 53071)
		Datalogger Management (PID 57976)
		Inclinometer readings automatic (PID 53772)
		General survey (PID 53135)
		And other procedures and TARPs detailed below
	Stability Technicians *(and where relevant 1 x 7 Crews)* are trained by Geotechnical Engineer and/or Hydrogeologist and/or Geologist.	Water quality and flow monitoring (PID 58067)
		Rainfall data collection and management (PID 53136)
		Rainfall TARP (PID 53140)
		Stability groundwater level TARP (PID 53141)
		Significant Inflow of Water TARP (PID XXXXX)
		Area of interest monitoring (PID 50957)
		Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		Ground movement TARP (PID 56942)
		Groundwater Monitoring using a Juno (PID 53131)
		Mine stability technician competency checklist (PID 54334)
	Six monthly ground movement monitoring (pins) by Mine Surveyors / Survey Technicians.	RTK GNSS Monitoring Survey Procedure (Internal) (PID 51474)
		RTK GNSS Monitoring Survey Procedure (External) (PID 51472)
		Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		Ground movement TARP (PID 56942)
	Quarterly seismic reporting is completed (external supplier).	Seismology Research Centre (SRC) quarterly reporting
		SRC immediate notifications of seismic events
	Monthly groundwater level monitoring by the Stability Technician	Water quality and flow monitoring (PID 58067)
		Rainfall data collection and management (PID 53136)
		Groundwater Monitoring using a Juno (PID 53131)
		Rainfall TARP (PID 53140)

Monitoring of ground movement and hydrogeological conditions by instrumentation		
		Stability groundwater level TARP (PID 53141)
	Monthly ground movement monitoring (prisms) by Mine Surveyors / Survey Technicians.	Total station survey monitoring procedure (PID 55119)
		Static GNSS Monitoring Survey Procedure (PID 51475)
		Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		Ground movement TARP (PID 56942)
	Modelling is completed by appropriate technical professionals	Alluvium lake edge modelling and monitoring, Landloch erosion modelling and monitoring, and Golder ground movement modelling and monitoring reports.
	Implementation of TARP in response to trigger events	Rainfall data collection and management (PID 53136)
		Rainfall TARP (PID 53140)
		Significant Inflow of Water TARP (PID XXXXX)
		Stability Groundwater Level TARP (PID 53141)
		Ground Movement TARP (PID 56942)
		Mine Preparedness Plan Rainfall (PID 55263)
	Citect (Real Time Monitoring) and Alert system monitored by Geotechnical Engineer / 1 x 7 Services Supervisor (and 1 x 7 Crews) during severe weather and rainfall events.	Ground Movement TARP (PID 56942)
		Rainfall TARP (PID 53140)
		Significant Inflow of Water TARP (PID XXXXX)
		Standard work procedure Monitoring of Ground Movement through extensometer (PID 55185)
Verification Process	Monthly ground movement monitoring results reported.	Hazelwood Technical Services Manager
	Monthly Geotechnical and Hydrogeological Report is issued.	Hazelwood Technical Services Manager
	Monthly monitoring records are completed as per the GCMP (data and monitoring frequencies) and reviewed.	Mine Stability Technician
	Documented training of Technicians by Geotechnical Engineers and / or Hydrogeologists and / or Geologists.	Human Resources
	Geotechnical Engineers and / or Hydrogeologists and / or Geologists are appropriately qualified.	Human Resources

Monitoring of ground movement and hydrogeological conditions by instrumentation		
	Instrumentation calibration checks carried out by Technician and checked by Geotechnical Engineers and / or Hydrogeologists and / or Geologists.	Geotechnical Engineers and / or Hydrogeologists and / or Geologists.
Target Performance	All monthly Geotechnical and Hydrogeological Reports are completed and sent out to the Hazelwood Rehabilitation Project Management Team with key issues highlighted.	
	100% of personnel are trained and competent or are being supervised by someone who is trained and competent in the operation and maintenance of the instrumentation.	
	Critical surface movement, as defined in the TARPs not to exceed 5mm/day over a monthly period in the Active Rehabilitation Area or 2mm/day over a monthly period in Non Active Areas.	
Trigger for shutdown, review or investigation	1 x month of Geotechnical and Hydrogeological Reporting is not completed.	
	Final batter movement event causes equipment damage or impact to public infrastructure, environment and public safety	
	1 x month of monitoring data is not captured	
	Surface movement exceeds 5mm/ day over a monthly period in Active Rehabilitation Area or 2mm/ day over a monthly period in Non-Active Rehabilitation Areas.	
Effectiveness and Escalation	The effectiveness of the monitoring system critical control is determined by the number stability events it is able to "foresee" at early development stage. Historically stability events have been detected within the Mine enabling preventative response actions.	
	2 x months of Geotechnical and Hydrogeological Reporting is not completed, Hazelwood Technical Services Manager raise with Hazelwood Rehabilitation Project Director.	

Monitoring of ground movement, erosion and hydrogeological conditions by instrumentation		
Responsible Officer	Hazelwood Rehabilitation Project Manager	
Link to bowtie analysis / risk assessment	Historically it has been proven that planned and effective monitoring of ground movement and hydrogeological conditions within the mine will limit the frequency of instability events.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Cracks and joints in coal allow water entry	Threat: Seismic event
	Threat: High aquifer pressures	RMP Outcome - Unexpected Movement (public health and safety)
	Threat: High rainfall event	RMP Outcome - Impact on Community Facilities (services provided by infrastructure)
	Threat: Inadequate design / implementation of mine rehabilitation / surcharge dump	Erosion
	Geotechnical instability of insitu overburden and/or coal	Ash comes in contact with water
	Erosion leading to degradation of rehabilitated batters	Infiltration of water through Morwell Main Drain (MMD)
	Erosion at shoreline	Unplanned or differential ground movement
	Uncontrolled floor heave	Dams and water retaining structure failure
	Extreme rainfall event resulting in overtopping of pit lake	Poor pit lake water quality entering Haunted Hills aquifer
	Poor pit lake water quality entering M1 aquifer	Poor pit lake water quality entering M2 aquifer
	Slope failure of overburden dump	
Critical Control	This is a human activity and technological critical control. The human activity is planning and managing so as to ensure a sufficient number and spread of monitoring instrumentation to monitor ground movement and hydrogeological conditions within and around the mine. The technology is the fixed monitoring instrumentation, which either provides core data with additional real time monitoring or provides remote monitoring capability to determine if ground movements and aquifer pressures are within acceptable limits.	
Specific Objectives	Provide a suitable number and spread of fixed monitoring instrumentation and remote monitoring capability that is installed and managed within the mine. Routinely monitor ground movement (including erosion) and hydrogeological conditions as per the GCMP and TARPs.	
Performance Requirements	Suitable and functional equipment is designed and installed to monitor ground movement (including erosion) and hydrogeological conditions.	
	Suitable and functional equipment is maintained to monitor ground movement (including erosion) and hydrogeological conditions.	

	Each monitoring instrument is capable of measuring either ground movement (including erosion), water levels within the batters and aquifer levels below the mine.	
	Mine Surveyors / Survey Technicians are appropriately experienced or qualified.	
	Stability Technicians are competent in monitoring of the hydrogeological monitoring bores.	
	Hazelwood Rehabilitation Project team and / or Hydrogeologists and / or Geologists are competent in the use of all monitoring systems.	
	Geotechnical Engineers and / or Hydrogeologists and / or Geologists are appropriately qualified.	
Activities	Planning, installation and commissioning of monitoring equipment is undertaken under the supervision of the Geotechnical Engineers and / or Hydrogeologists and / or Geologists and / or GIS / Spatial Coordinator.	Hydrogeology Management Plan (PID 53213)
		Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		Installation of vibrating wire piezometers and stand pipes in a borehole (PID 53064)
	Stability Technicians and Mine Surveyors / Survey Technicians undertake monitoring as per GCMP monitoring program.	Vibrating wire piezometer and standpipe monitoring (PID 57944)
		Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		Continuous GNSS / Citect Monitoring System Overview (PID 54335)
		Groundwater Monitoring using a Juno (PID 53131)
		Inclinometer readings manual (PID 57978)
		Water quality and flow monitoring (PID 58067)
		Reading vertical displacement from an extensometer (PID 53067)
		Reading horizontal displacement from an extensometer (PID 53071)
		Datalogger Management (PID 57976)
		Inclinometer readings automatic (PID 53772)
		General survey (PID 53135)
		And other procedures and TARPs detailed below
	Stability Technicians *(and where relevant Project Team)* are trained by Geotechnical Engineer and/or Hydrogeologist and/or Geologist.	Water quality and flow monitoring (PID 58067)
		Rainfall data collection and management (PID 53136)
		Rainfall TARP (PID 53140)
		Stability groundwater level TARP (PID 53141)
		Ground Control Management Plan (GCMP V7 2021) (PID 56966)

		Ground movement TARP (PID 56942)
		Groundwater Monitoring using a Juno (PID 53131)
		Mine stability technician competency checklist (PID 54334)
	Ground movement monitoring (pins) by Mine Surveyors / Survey Technicians.	RTK GNSS Monitoring Survey Procedure (Internal) (PID 51474)
		RTK GNSS Monitoring Survey Procedure (External) (PID 51472)
		Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		Ground movement TARP (PID 56942)
	Quarterly seismic reporting is completed (external supplier).	Seismology Research Centre (SRC) quarterly reporting
		SRC immediate notifications of seismic events
	Groundwater level monitoring by the Stability Technician	Water quality and flow monitoring (PID 58067)
		Rainfall data collection and management (PID 53136)
		Groundwater Monitoring using a Juno (PID 53131)
		Rainfall TARP (PID 53140)
		Stability groundwater level TARP (PID 53141)
	Ground movement monitoring (prisms or remote surface topography surveys) by Mine Surveyors / Survey Technicians.	Total station survey monitoring procedure (PID 55119)
		Static GNSS Monitoring Survey Procedure (PID 51475)
		Ground Control Management Plan (GCMP V7 2021) (PID 56966)
		Ground movement TARP (PID 56942)
	Modelling is completed by appropriate technical professionals	Alluvium lake edge modelling and monitoring, Landloch erosion modelling and monitoring, and Golder ground movement modelling and monitoring reports.
	Implementation of TARP in response to trigger events	Rainfall data collection and management (PID 53136)
		Rainfall TARP (PID 53140)
		Stability Groundwater Level TARP (PID 53141)
		Ground Movement TARP (PID 56942)
		Preparedness Plan Rainfall (PID 55263)
	Real Time Monitoring and Alert system monitored by Geotechnical Engineer and	Ground Movement TARP (PID 56942)
		Rainfall TARP (PID 53140)

	Project Team during severe weather and rainfall events.	Significant Inflow of Water TARP (PID XXXXX)
		Standard work procedure Monitoring of Ground Movement through extensometer (PID 55185)
Verification Process	Ground movement monitoring results reported.	Hazelwood Rehabilitation Project Manager
	Geotechnical and Hydrogeological Report is issued.	Hazelwood Rehabilitation Project Manager
	Monitoring records are completed as per the GCMP (data and monitoring frequencies) and reviewed.	Mine Stability Technician
	Documented training of Technicians by Geotechnical Engineers and / or Hydrogeologists and / or Geologists.	Human Resources
	Geotechnical Engineers and / or Hydrogeologists and / or Geologists are appropriately qualified.	Human Resources
	Instrumentation calibration checks carried out by Technician and checked by Geotechnical Engineers and / or Hydrogeologists and / or Geologists.	Geotechnical Engineers and / or Hydrogeologists and / or Geologists.
Target Performance	All Geotechnical and Hydrogeological Reports are completed and sent out to the Hazelwood Rehabilitation Project Management Team with key issues highlighted.	
	100% of personnel are trained and competent or are being supervised by someone who is trained and competent in the operation and maintenance of the instrumentation.	
	Critical surface movement, not to exceed defined TARP level.	
Trigger for shutdown, review or investigation	1 x GCMP time stipulated Geotechnical and Hydrogeological Reporting is not completed.	
	Final batter movement event causes equipment damage or impact to public infrastructure, environment and public safety	
	1 x GCMP time stipulated monitoring data set is not captured	
	Surface movement exceeds TARP values.	
Effectiveness and Escalation	The effectiveness of the monitoring system critical control is determined by the number stability events it is able to "foresee" at early development stage. Historically stability events have been detected within the Mine enabling preventative response actions.	
	2 x GCMP time stipulated Geotechnical and Hydrogeological Reporting is not completed, issue is raised with Hazelwood Rehabilitation Project Manager.	

Penstock - 3GL Water Flow (Morwell River Flood Diversion Structure)		
Responsible Officer	Hazelwood Technical Services Manager	
Link to bowtie analysis / risk assessment	In order to limit the volume of water that is allowed to enter the mine through the Morwell River Flood Diversion (MRFD) structure, a penstock (control system), is required to be installed. This penstock will only allow 3GL of water per day to enter the mine, with any flood water over the 3GL per day reporting through to the Morwell River proper and the containing protective levees.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Mine uncontrollably inundated by large volume of external water	RMP Outcome - Failure of Morwell Main Drain (public health and safety)
	Threat: Cracks and joints in coal allow water entry.	RMP Outcome - Mine Inundation (environmental contamination event)
	Threat: Surface erosion (wave action and large volume of water entering the mine)	RMP Outcome - Unexpected Movement (public health and safety)
	Unplanned or differential ground movement	RMP Outcome - Impact on Community Facilities (services provided by infrastructure)
Critical Control	This is a human activity and technological critical control. The human activity is reviewing current site conditions, noting predictive weather / flooding forecasts and operating the penstock accordingly. The technology is the penstock control itself and the mechanical components.	
Specific Objectives	Routinely assess relevant ground and mine conditions along with predictive weather / flooding forecasts and operate the penstock so as to limit any Morwell River flood waters entering the mine to 3GL per day.	
Performance Requirements	Suitable and functional equipment is designed and installed to monitor ground and mine conditions along with predictive weather / flooding forecasts and suitable and functional equipment is designed and installed to limit any Morwell River flood waters entering the mine to 3GL per day.	
	Suitable and functional equipment is maintained to monitor ground and mine conditions along with predictive weather / flooding forecasts and suitable and functional equipment is maintained to limit any Morwell River flood waters entering the mine to 3GL per day.	
	1 x 7 Crews, 1 x 7 Services Supervisors and Hazelwood Technical Services personnel are competent to monitor *(their relevant component of)* ground and mine conditions along with predictive weather / flooding forecasts.	
	1 x 7 Crews are competent in operation of the penstock control system.	
Activities	Planning, installation and commissioning of monitoring equipment is undertaken under the supervision of the Geotechnical Engineer, Hydrogeologist or Geologist.	Hydrogeology Management Plan (PID 53213)
		Ground control management plan (GCMP v5 2019) (PID 56966)
		Activity plan for drilling a pilot bore (PID 52176)
		Installation of vibrating wire piezometers and standpipes in a borehole (PID 53064)

Penstock - 3GL Water Flow (Morwell River Flood Diversion Structure)		
	Stability Technicians and Mine Surveyors / Mine Survey Technicians undertake monitoring as per GCMP monitoring program.	Vibrating wire piezometer and standpipe monitoring (PID 52216)
		Area of interest monitoring (PID 50957)
		Ground control management plan (GCMP v5 2019) (PID 56966)
		Continuous GNSS Monitoring System Overview (PID 54335)
		Inclinometer readings manual (PID 52114)
		Water quality and flow monitoring (PID 53065)
		Reading vertical displacement from an extensometer (PID 53067)
		Reading horizontal displacement from an extensometer (PID 53071)
		Datalogger Management (PID 53131)
		Inclinometer readings automatic (PID 53132)
		General survey (PID 53135)
		And other procedures and TARPs detailed below
	Hazelwood Services Superintendent ensures 1 x 7 Services Supervisors and 1 x 7 Crews are trained in operation and maintenance of the Penstock.	Monthly Penstock Functional Inspection and Report (PID YYYYY)
	Stability Technician is trained by Geotechnical Engineer, Hydrogeologist or Geologist.	Water quality and flow monitoring (PID 53065)
		Rainfall data collection and management (PID 53136)
		Rainfall TARP (PID 53140)
		Stability groundwater level TARP (PID 53141)
		Area of interest monitoring (PID 50957)
		Ground control management plan (GCMP v5 2019) (PID 56966)
		Ground movement TARP (PID 56942)
		Mine stability technician competency checklist (PID 54334)
	Monthly groundwater level monitoring by the Stability Technician.	Water quality and flow monitoring (PID 53065)
		Rainfall data collection and management (PID 53136)
		Rainfall TARP (PID 53140)

Penstock - 3GL Water Flow (Morwell River Flood Diversion Structure)		
		Stability groundwater level TARP (PID 53141)
	Monthly ground movement monitoring (prisms) by the Mine Surveyor / Mine Survey Technicians.	Total station survey monitoring procedure (PID 51476)
		Static GNSS Monitoring Survey Procedure (PID 51475)
		Ground control management plan (GCMP v5 2019) (PID 56966)
		Ground movement TARP (PID 56942)
	Implementation of TARP in response to trigger events.	Rainfall data collection and management (PID 53136)
		Significant Inflow of Water TARP (PID XXXXX)
		Geotechnical Hazard TARP (PID 53232)
		Rainfall TARP (PID 53140)
		Stability groundwater level TARP (PID 53141)
		Ground movement TARP (PID 56942)
		Mine Preparedness Plan Rainfall (PID 55263)
	Alert system (Citech Real Time System) monitored by Geotechnical Engineer and 1 x 7 Services Supervisor 3 days prior and during severe weather events.	Ground movement TARP (PID 56942)
		Rainfall TARP (PID 53140)
		Standard work procedure Monitoring of Ground Movement through extensometer (PID 55185)

Verification Process	Monthly ground movement monitoring results reported.	Hazelwood Technical Services Manager
	Monthly Penstock functional inspection is conducted, and written report is issued.	Hazelwood Services Superintendent
	Monthly Geotechnical and Hydrogeological Report is issued.	Hazelwood Technical Services Manager
	Monthly monitoring records are completed as per the GCMP (data and monitoring frequencies) and reviewed.	Mine Stability Technician
	Documented training of Technician by Geotechnical Engineer and Hydrogeologist or Geologist.	Human Resources
	Geotechnical Engineer, Hydrogeologist and Geologist are appropriately qualified.	Human Resources

Penstock - 3GL Water Flow (Morwell River Flood Diversion Structure)		
	Instrumentation calibration checks carried out by Stability Technician and checked by Geotechnical Engineer or Geologist.	Mine Geotechnical Engineer
Target Performance	All monthly Geotechnical and Hydrogeological Reports are completed and sent out to the Hazelwood Project Team with key issues highlighted.	
	All monthly Penstock functional inspections are conducted, and reports are issued to Mine Services Superintendent.	
	100% of personnel are trained and competent or are being supervised by someone who is trained and competent in the operation and maintenance of the instrumentation.	
	Critical surface movement, as defined in the TARPs not to exceed 5mm/day over a monthly period in the Active Rehabilitation Area or 2mm/day over a monthly period in Non Active Areas.	
Trigger for shutdown, review or investigation	1 x month of Geotechnical and Hydrogeological Reporting is not completed.	
	1 x month of Penstock functional inspections are not conducted, and reports are not issued to Hazelwood Services Superintendent.	
	Final batter movement event causes equipment damage or impact to public infrastructure, environment and public safety	
	1 x month of monitoring data is not captured	
	Surface movement exceeds 5mm/ day over a monthly period in Active Rehabilitation Area or 2mm/ day over a monthly period in Non-Active Rehabilitation Areas.	
Effectiveness and Escalation	The effectiveness of the monitoring system critical control is determined by the number stability events it is able to "foresee" at early development stage. Historically stability events have been detected within the Mine enabling preventative response actions.	
	2 x months of Geotechnical and Hydrogeological Reporting and 2 x months of Penstock functional inspections are not completed, Hazelwood Services Superintendent raise with Hazelwood Rehabilitation Project Director.	

Morwell River Interconnection Structure		
Responsible Officer	Hazelwood Rehabilitation Project Manager	
Link to bowtie analysis	In order to limit the volume of water that is allowed to enter the mine through the Morwell River Interconnection structure, a penstock (control system), has been installed. This penstock will allow a basal flow of 2.5GL of water per annum to enter the mine (sustainable diversion limit), with any flood water over the 2.5GL per annum reporting through to the Morwell River proper and the containing protective levees. Noting that in the event of major flooding downstream, the penstock will be able to be opened to allow 3 GL/day to enter the mine.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Mine uncontrollably inundated by large volume of external water	RMP Outcome - Unexpected Movement (public health and safety)
	Threat: Cracks and joints in coal allow water entry.	RMP Outcome - Impact on Community Facilities (services provided by infrastructure)
	Threat: Surface erosion (wave action and large volume of water entering the mine)	
Critical Control	This is a human activity and technological critical control. The human activity is reviewing current site conditions, noting predictive weather / flooding forecasts and operating the penstock accordingly. The technology is the penstock control itself and the mechanical components.	
Specific Objectives	Routinely assess relevant ground and mine conditions along with predictive weather / flooding forecasts and maintain the penstock so as to limit any Morwell River flows entering the mine to 2.5GL per annum.	
Performance Requirements	Suitable and functional equipment is designed and installed to monitor ground and mine conditions along with predictive weather / flooding forecasts and suitable and functional equipment is designed and installed to limit any Morwell River flows entering the mine to 2.5GL per annum.	
	Suitable and functional equipment is maintained to monitor ground and mine conditions along with predictive weather / flooding forecasts and suitable and functional equipment is maintained to limit any Morwell River flows entering the mine to 2.5GL per annum.	
	Hazelwood Rehabilitation Project team personnel are competent to monitor *(their relevant component of)* ground and mine conditions along with predictive weather / flooding forecasts.	
	Hazelwood Rehabilitation Project team are competent in operation of the penstock control system.	
Activities	Planning, installation and commissioning of monitoring equipment is undertaken under the supervision of the Geotechnical Engineer, Hydrogeologist or Geologist.	Hydrogeology Management Plan (PID 53213)
		Ground control management plan (GCMP v5 2019) (PID 56966)
	Stability Technicians and Mine Surveyors / Mine Survey Technicians undertake	Vibrating wire piezometer and standpipe monitoring (PID 52216)
		Area of interest monitoring (PID 50957)

	monitoring as per GCMP monitoring program.	Ground control management plan (GCMP v5 2019) (PID 56966)
		Continuous GNSS Monitoring System Overview (PID 54335)
		Inclinometer readings manual (PID 52114)
		Water quality and flow monitoring (PID 53065)
		Reading vertical displacement from an extensometer (PID 53067)
		Reading horizontal displacement from an extensometer (PID 53071)
		Datalogger Management (PID 53131)
		Inclinometer readings automatic (PID 53132)
		General survey (PID 53135)
		And other procedures and TARPs detailed below
	Hazelwood Rehabilitation Project Manager ensures Project team are trained in operation and maintenance of the Penstock.	Two monthly Penstock Functional Inspection and Report (PID YYYYY)
	Stability Technician is trained by Geotechnical Engineer, Hydrogeologist or Geologist.	Water quality and flow monitoring (PID 53065)
		Rainfall data collection and management (PID 53136)
		Rainfall TARP (PID 53140)
		Stability groundwater level TARP (PID 53141)
		Area of interest monitoring (PID 50957)
		Ground control management plan (GCMP v5 2019) (PID 56966)
		Ground movement TARP (PID 56942)
		Mine stability technician competency checklist (PID 54334)
	Two monthly groundwater level monitoring by the Stability Technician.	Water quality and flow monitoring (PID 53065)
		Rainfall data collection and management (PID 53136)
		Rainfall TARP (PID 53140)
		Stability groundwater level TARP (PID 53141)
	Two monthly ground movement monitoring (prisms) by the Mine Surveyor / Mine Survey Technicians.	Total station survey monitoring procedure (PID 51476)
		Static GNSS Monitoring Survey Procedure (PID 51475)

		Ground control management plan (GCMP v5 2019) (PID 56966)
		Ground movement TARP (PID 56942)
	Implementation of TARP in response to trigger events.	Rainfall data collection and management (PID 53136)
		Significant Inflow of Water TARP (PID XXXXX)
		Geotechnical Hazard TARP (PID 53232)
		Rainfall TARP (PID 53140)
		Stability groundwater level TARP (PID 53141)
		Ground movement TARP (PID 56942)
		Preparedness Plan Rainfall (PID 55263)
	Alert system (Citech Real Time System) monitored by Geotechnical Engineer and Hazelwood Rehabilitation Project team 3 days prior and during severe weather events.	Ground movement TARP (PID 56942)
		Rainfall TARP (PID 53140)
		Standard work procedure Monitoring of Ground Movement through extensometer (PID 55185)
Verification Process	Ground movement monitoring results reported.	Hazelwood Rehabilitation Project Manager
	Penstock functional inspection is conducted and written report is issued.	Hazelwood Rehabilitation Project Manager
	Geotechnical and Hydrogeological Report is issued.	Hazelwood Rehabilitation Project Manager
	Monitoring records are completed as per the GCMP (data and monitoring frequencies) and reviewed.	Mine Stability Technician
	Documented training of Technician by Geotechnical Engineer and Hydrogeologist or Geologist.	Human Resources
	Geotechnical Engineer, Hydrogeologist and Geologist are appropriately qualified.	Human Resources
	Instrumentation calibration checks carried out by Stability Technician and checked by Geotechnical Engineer or Geologist.	Mine Geotechnical Engineer
Target Performance	Geotechnical and Hydrogeological Reports are completed and sent out to the Hazelwood Project Team with key issues highlighted.	
	Penstock functional inspections are conducted and reports are issued to Hazelwood Rehabilitation Project Manager	
	100% of personnel are trained and competent or are being supervised by someone who is trained and competent in the operation and maintenance of the instrumentation.	
	Critical surface movement, not to exceed levels as defined in the TARPs	
	1 x GCMP time stipulated Geotechnical and Hydrogeological Report is not completed.	

Trigger for shutdown, review or investigation	1 x GCMP time stipulated Penstock functional inspections are not conducted and reports are not issued to Hazelwood Rehabilitation Project Manager
	Final batter movement event causes equipment damage or impact to public infrastructure, environment and public safety
	1 x GCMP time stipulated runs of monitoring data is not captured
	Surface movement exceeds levels as defined in the TARPs
Effectiveness and Escalation	The effectiveness of the monitoring system critical control is determined by the number stability events it is able to "foresee" at early development stage. Historically stability events have been detected within the Mine enabling preventative response actions.
	2 x GCMP time stipulated Geotechnical and Hydrogeological Reports and 2 x GCMP time stipulated Penstock functional inspections are not completed, issue is raised with Hazelwood Rehabilitation Project Steering Committee.

Aquifer water quality monitoring		
Responsible Officer	Hazelwood Technical Services Manager	
Link to bowtie analysis / risk assessment	Unmanaged or uncontrolled mine lake filling and seepage of poor-quality water to the groundwater aquifers. This threat will apply from the commencement of lake filling primarily to the M1 aquifer due to its proximity below the mine floor, and as the lake fills, potentially to the Haunted Hills aquifer as it re-saturates adjacent to the mine. The M1 and M2 aquifer pump bore network has been relocated from inside of the mine to outside of the mine crest. All pump bores and other boreholes within the mine have been sealed and decommissioned prior to mine lake filling commencing. Following the M2 aquifer heave event that occurred in the early 1970s, non-artesian M1 and M2 aquifer pressures have generally been maintained.	
	This Critical Control Performance Standard addresses the risk associated with the below:	
	RMP Outcome - Contamination of aquifers (surface or groundwater contamination)	
	Poor pit lake water quality entering M1 aquifer	Poor pit lake water quality entering M2 aquifer
Critical Control	Planned and routine M1 and M2 aquifer groundwater quality monitoring of operational depressurisation pump bores and sampling of Haunted Hills Formation monitoring bores.	
Specific Objectives	Routine water quality monitoring of M1 and M2 aquifer pump bores and Haunted Hills Formation monitoring bores to characterise baseline groundwater quality by aquifer to detect deleterious variations from baseline conditions indicative of possible poor quality water seepage from the mine lake.	
	Stability Coordinator to issue a six-monthly interpretation report to Technical Services Manager to align with the Declared Mines Report, March and September each year.	
	Provide input data to the lake water balance and water quality modelling.	
Performance Requirements	Groundwater samples to be obtained from operating M1 and M2 Aquifer pumping bore headworks ensuring representative samples are obtained and analysed by appropriate NATA registered laboratory for analytical suite as specified in with Mine Artesian Dewatering Monitoring Program.	
	Haunted Hills Formation monitoring bores to be sampled in accordance with EPA Groundwater sampling guidelines and reported against relevant groundwater beneficial use environmental quality indicators.	
	Results reviewed and reported by qualified hydrogeologist / environmental scientist.	
	Groundwater extraction within licenced Southern Rural Water allocations and all groundwater discharges metered.	
Activities	Groundwater Quality Pump Bore monitoring and reporting 6 monthly frequency.	Mine Artesian Dewatering Monitoring Program ENGIE Reference 2676
	Weekly inspections and collecting information on pump bore operations including recording pumped extractions flow rate and pumping water levels.	Groundwater Quality Monitoring Procedure Collecting Pump Data Bore (PID: 53268)
	Groundwater sampling and analysis of Haunted Hills Formation monitoring bores, program and frequency to be developed in accordance with lake filling.	Groundwater sampling procedure to be developed in accordance with groundwater sampling, analysis and reporting guidelines.
	Decommissioning and sealing failed pump bores.	Bore Decommissioning Procedure 2016 (PID: 55397).
Verification Process	Groundwater Quality Reporting proposed six monthly frequency.	Stability Coordinator

Aquifer water quality monitoring		
	Monthly Geotechnical and Hydrogeological Report is issued.	Hazelwood Technical Services Manager
Target Performance	Groundwater sampling program completed in accordance with ENGIE procedure.	
	Database of field and laboratory groundwater quality results maintained.	
	Water quality trigger level exceedances for M1 and M2 aquifer identified, anomalous trends further investigated and appropriate response actioned.	
	Water quality environmental quality indicator exceedances for Haunted Hills Formation identified anomalous trends further investigated and appropriate response actioned.	
Trigger for shutdown, review or investigation	Results exceed Trigger levels as identified Mine Artesian Dewatering Monitoring Program.	
	Sustained change in groundwater quality or physical parameters indicate aquifer connection to the mine lake has occurred and is detrimentally impacting aquifer water quality	
Effectiveness and Escalation	The effectiveness of the aquifer water quality sampling program to detect an aquifer/lake connection event should it occurs, is affected by location of the connection relative to the pump bore location and aquifer properties.	

Aquifer water quality monitoring		
Responsible Officer	Hazelwood Rehabilitation Project Manager	
Link to bowtie analysis / risk assessment	Unmanaged seepage of poor-quality water to the groundwater aquifers. This threat will remain during the passive rehabilitation stage, however it is expected to reduce as pressure differentials between the aquifers and the mine lake reduce over time. The M1 and M2 aquifer pump bore network has been relocated from inside of the mine to outside of the mine crest. All pump bores and other boreholes within the mine have been sealed and decommissioned prior to mine lake filling commencing.	
	This Critical Control Performance Standard addresses the risk associated with the below:	
	RMP Outcome - Contamination of aquifers (surface or groundwater contamination)	
	Poor pit lake water quality entering M1 aquifer	Poor pit lake water quality entering M2 aquifer
Critical Control	Planned and routine M1 and M2 aquifer groundwater quality monitoring of operational depressurisation pump bores and sampling of Haunted Hills Formation monitoring bores.	
Specific Objectives	Routine water quality monitoring of M1 and M2 aquifer pump bores and Haunted Hills Formation monitoring bores to characterise baseline groundwater quality by aquifer to detect deleterious variations from baseline conditions indicative of possible poor quality water seepage from the mine lake.	
	Stability Coordinator to issue an annual interpretation report to Hazelwood Rehabilitation Project Manager to align with the Declared Mines Report.	
	Provide input data to the lake water balance and water quality modelling.	
Performance Requirements	Groundwater samples to be obtained from operating M1 and M2 Aquifer pumping bore headworks ensuring representative samples are obtained and analysed by appropriate NATA registered laboratory for analytical suite as specified in with Mine Artesian Dewatering Monitoring Program.	
	Haunted Hills Formation monitoring bores to be sampled in accordance with EPA Groundwater sampling guidelines and reported against relevant groundwater beneficial use environmental quality indicators.	
	Results reviewed and reported by qualified hydrogeologist / environmental scientist.	
	Groundwater extraction within licenced Southern Rural Water allocations and all groundwater discharges metered.	
Activities	Groundwater Quality Pump / Monitoring Bore monitoring and reporting annual frequency.	Artesian Dewatering Monitoring Program ENGIE Reference 2676
		Groundwater Quality Monitoring Procedure Collecting Pump Data Bore (PID: 53268)
	Decommissioning and sealing failed pump bores.	Bore Decommissioning Procedure 2016 (PID: 55397).
Verification Process	Groundwater Quality Reporting.	Stability Coordinator
	Geotechnical and Hydrogeological Report is issued.	Hazelwood Rehabilitation Project Manager
Target Performance	Groundwater sampling program completed in accordance with ENGIE procedure.	
	Database of field and laboratory groundwater quality results maintained.	
	Water quality trigger level exceedances for M1 and M2 aquifer identified, anomalous trends further investigated and appropriate response actioned.	
	Water quality environmental quality indicator exceedances for Haunted Hills Formation identified anomalous trends further investigated and appropriate response actioned.	

Aquifer water quality monitoring	
Trigger for shutdown, review or investigation	Results exceed Trigger levels as identified Mine Artesian Dewatering Monitoring Program.
	Sustained change in groundwater quality or physical parameters indicate aquifer connection to the mine lake has occurred and is detrimentally impacting aquifer water quality
Effectiveness and Escalation	The effectiveness of the aquifer water quality sampling program to detect an aquifer/lake connection event should it occurs, is effected by location of the connection relative to the pump bore location and aquifer properties.

Aquifer water quality monitoring		
Responsible Officer	Hazelwood Rehabilitation Project Manager	
Link to Risk Assessment	Mine lake water quality water remains aligned with background 'fill source' water quality so as to support post relinquishment land uses and support natural ecosystems. Mine lake water quality develops according to RGS Stage 4 assessment work - GoldSim model.	
	This Critical Control Performance Standard addresses the risk associated with the below:	
	Risk Assessment Source / Event -	
	Pit lake temporarily impacted due to contamination from MMD and other surface water source(s)	Stratification of pit lake followed by a mixing event
	Water quality degrades in the pit lake due to geochemical reactions within pit such as acid generation, leaching of contaminants from HARA, PFAS exposure	Poor pit lake water quality entering Haunted Hills aquifer
	Poor water quality in the pit lake due to biological activity due to nutrients in source water (i.e. blue green algae)	Poor pit lake water quality entering M1 aquifer
	Contaminated water discharges from pit lake into receiving waterways	Poor pit lake water quality entering M2 aquifer
Critical Control	Planned and routine mine lake water quality monitoring	
Specific Objectives	Routine water quality monitoring of mine lake water quality to confirm mine lake water quality meets predicted expectations provided by RGS GoldSim modelling and then to detect deleterious variations from predicted model conditions indicative of the development of unexpected water quality within the mine lake.	
	Stability Coordinator to issue an annual interpretation report to Hazelwood Rehabilitation Project Manager to align with the Declared Mines Report.	
	Provide input data to the mine lake water balance and water quality modelling confirmatory process.	
Performance Requirements	Mine lake water samples to be obtained from the mine lake at nominated locations, ensuring representative samples are obtained and analysed by appropriate NATA registered laboratory for analytical suite as specified in the RGS GoldSim model.	
	Measurements taken ideally using a floating pontoon fitted with in-situ probes that can log at 15-minute intervals and measure (as a minimum) temperature, pH, Eh, TDS and dissolved oxygen. Multiparameter probes (e.g. YSI CastAway-CTD; temperature and EC) with pressure transducer (depth). Approximately every 6-months or based on in-situ probe readings. Deep water quality monitoring using Niskin sampling bottle with samples measured for full suite of chemical parameters e.g. nutrients, salts and metal(loids). Approximately every 6-months, determined by in-situ probe and multiparameter readings.	
	Results reviewed and reported by qualified environmental scientist.	
Activities	Mine lake surface water and deep-water quality monitoring	Mine lake water quality monitoring program ENGIE Reference XXXX
	Monitoring data used to update RGS numerical mine lake water model.	Annual update of GoldSim model ENGIE Reference 2676
Verification Process	Mine lake water quality reporting.	Stability Coordinator
	Geotechnical and Hydrogeological Report is issued.	Hazelwood Rehabilitation Project Manager
Target	Mine lake water quality sampling program completed in accordance with ENGIE procedure.	

Aquifer water quality monitoring	
Performance	Database of quality results maintained.
	Water quality trigger level exceedances identified, anomalous trends further investigated and appropriate response actioned.
	Water quality environmental quality indicator exceedances identified anomalous trends further investigated and appropriate response actioned.
Trigger for shutdown, review or investigation	Results exceed Trigger levels as identified RGS GoldSim model.
	Sustained change in mine lake water quality or physical parameters not anticipated by RGS GoldSim modelling.
Effectiveness and Escalation	The effectiveness of the mine water quality sampling program to detect a variation which is considered to be outside of the range of acceptable results as provided by the RGS GoldSim model.

Aquifer water quality monitoring		
Responsible Officer	Hazelwood Rehabilitation Project Manager	
Link to Risk Assessment	To maintain the level of the Hazelwood mine lake at approximately* +45m AHD. The variation of the Hazelwood mine lake will be maintained using a combination of engineering and administrative controls.	
	This Critical Control Performance Standard addresses the risk associated with the below:	
	Risk Assessment Source / Event -	
	Unplanned or differential ground movement	Uncontrolled floor heave
	Erosion at shoreline	Geotechnical instability of insitu overburden and/or coal
Critical Control	Maintain the level of the Hazelwood mine lake at approximately* +45m AHD via engineering and administrative controls.	
Specific Objectives	The variation of the Hazelwood mine lake will be maintained using a combination of engineering and administrative controls. Engineering controls are those that will be physically constructed by ENGIE for the mine lake filling process and will remain post the completion of mine lake filling. Administrative controls will rely upon a number of key assumptions regarding the available mine lake level maintenance sources, i.e. 'top-up' sources.	
	Stability Coordinator to issue an annual interpretation report to Hazelwood Rehabilitation Project Manager to align with the Declared Mines Report.	
	Provide input data to the mine lake water balance and water quality modelling confirmatory process.	
Performance Requirements	To maintain the level of the Hazelwood mine lake at approximately* +45m AHD.	
	Any negative variations in lake level are immediately reported and the Hazelwood Lake Level Management Plan is enacted.	
Activities	Mine lake level monitoring and reporting annual frequency.	Mine lake water level monitoring program ENGIE Reference 2676
	Monitoring data used to update RGS numerical mine lake water model.	Annual update of GoldSim model ENGIE Reference 2676
Verification Process	Mine lake level monitoring and reporting is issued annually	Stability Coordinator
	Geotechnical and Hydrogeological Report is issued.	Hazelwood Rehabilitation Project Manager
Target Performance	Mine lake water level sampling program completed in accordance with ENGIE procedure.	
	Database of quality results maintained.	
	Water level trigger level exceedances identified, anomalous trends further investigated and appropriate response actioned and Hazelwood Lake Level Management Plan is enacted.	
Trigger for shutdown, review or investigation	Results exceed Trigger levels as identified Mine lake water level monitoring program.	
	Sustained lowering of lake level beyond prescribed trigger events.	
	Sustained change in mine lake water level or is not anticipated by RGS GoldSim modelling.	
Effectiveness and Escalation	The effectiveness of the mine lake water level sampling program to detect an event should it occurs and enact a response as prescribed in the Hazelwood Lake Level Management Plan.	

Site Access Control		
Responsible Officer	Site Security and Emergency Services Manager	
Link to bowtie analysis / risk assessment	Historically there have been events of trespassers entering the site and accessing plant. This has the potential to lead to a terrorist attack or discharge of a firearm onsite, resulting in an event which impacts on the environment and public health and safety.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Perimeter Breach	Threat: Wilful risky behaviour
	Threat: Deliberate Terrorist Act	Threat: Cyber Attack
	Threat: Protest / Industrial Event	Malicious acts or arson on site
	Unauthorised access of member of public into site	Authorised access in crest (e.g. in proximity to pit lake)
Critical Control	This is a human activity and technological critical control. The technological aspect involves perimeter fencing, electronic boom gates, slide gates, CCTV systems and access control systems to control and monitor access to the site. The human activity aspect is the employment of an on-site emergency security service to patrol, monitor and manage access to the site.	
Specific Objectives	All access to the site is monitored and controlled;	
	Effective response to any unauthorised access;	
	An Emergency Command and Control structure to effectively manage an incident; and	
	Suitably qualified people to address the nature of the event.	
Performance Requirements	All persons entering site are inducted and/ or authorised;	
	Manned 24 hour a day trained and competent site security;	
	CCTV in critical zones which is monitored by site security personnel;	
	Boundary fence limiting access to the site;	
	Random patrols by site security personnel and site personnel; and	
	Site security personnel are trained and competent.	
Activities	Inductions and issuing of individual site access cards to authorise access to site	Site Access Procedure (PID: 46327)
	Daily report of non-inducted persons entering the site	Site Access Procedure (PID: 46327)
	Trained and competent site security contractor is employed to be present on site 24 hours a day	Service Agreement with Emergency Services Provider.
	CCTV monitored by site security service provider 24 hours a day	Service Agreement with Emergency Services Provider.
	Daily perimeter patrols conducted by site security contractor	Service Agreement with Emergency Services Provider.
	Reporting of security breaches by onsite employees and contractors	INX hazard reporting
	90 Day review of access card inactivity, then cancellation of inactive access cards	Site Security and Risk Management Plan (PID: 32302).
	Monthly Activity Report – e.g. number of uses / activity/ vehicle searches/ bag searches on entry and exit	Service Agreement with Emergency Services Provider.

	Random audits of Swipe Card usage and authorised use	Service Agreement with Emergency Services Provider.

Site Access Control		
Verification Process	CCTV Records (maintained on server) related to events are reviewed	Site Security and Emergency Services Manager
	Electronic Patrol Records – review of monthly reports	Site Security and Emergency Services Manager
	Access Control Software – Access Reports reviewed upon request and daily	Site Security and Emergency Services Manager
	Site Access and Induction Request Reports / Records, review and approve	Site Security and Emergency Services Manager
	Annual audit of Site Security Risk Management Plan (ID: 32302).	Site Security and Emergency Services Manager
	Monthly Activity Report from Site Security Contractor	Site Security and Emergency Services Manager
Target Performance	No instances of unintentional unauthorised access to the site where induction has expired or was not approved	
	No instances of intentional unauthorised access to site and / or identify instances where a breach occurs.	
Trigger for shutdown, review or investigation	Any incident of intentional unauthorised access to site	
	An increase in the Security Alert (nominated by the business or government)	
	Where intelligence from a Third Party is received indicating a threat to the site	
Effectiveness and Escalation	2 reported intrusions onto Power Station site since closure in 2017	
	Evidence from reporting indicates there are some unintentional breaches of site security eg expired induction or not completed	
	Security assessment have been undertaken by third party consultant 2018	
	Failures or non-conformances to the Site Access Control requirements would be raised by the Site Security and Emergency Services Manager to the Hazelwood Rehabilitation Project Director	

Site Access Control		
Responsible Officer	Hazelwood Rehabilitation Project Manager	
Link to bowtie analysis / risk assessment	Historically there have been events of trespassers entering the site and accessing plant. This has the potential to lead to a terrorist attack or discharge of a firearm onsite, resulting in an event which impacts on the environment and public health and safety.	
	This Critical Control Performance Standard addresses the risks associated with the below:	
	Threat: Perimeter Breach	Threat: Wilful risky behaviour
	Threat: Deliberate Terrorist Act	Threat: Cyber Attack
	Threat: Protest / Industrial Event	Malicious acts or arson on site
	Unauthorised access of member of public into site	Authorised access in crest (e.g. in proximity to pit lake)
Critical Control	This is a human activity and technological critical control. The technological aspect involves perimeter fencing, electronic boom gates, slide gates, CCTV systems and access control systems to control and monitor access to the site. The human activity aspect is the employment of an emergency security service to patrol, monitor and manage access to the site for a period of 5 years post mine filling.	
Specific Objectives	All access to the site is monitored and controlled;	
	Effective response to any unauthorised access;	
	An Emergency Command and Control structure to effectively manage an incident; and	
	Suitably qualified people to address the nature of the event.	
Performance Requirements	All persons entering site are inducted and/ or authorised;	
	Boundary fence limiting access to the site;	
	Random patrols by site security personnel and site personnel; and	
	Site security personnel are trained and competent.	
Activities	Inductions and issuing of individual site access cards to authorise access to site	Site Access Procedure (PID: 46327)
	Daily report of non-inducted persons entering the site	Site Access Procedure (PID: 46327)
	Daily perimeter patrols conducted by site security contractor	Service Agreement with Emergency Services Provider.
	Reporting of security breaches by onsite employees and contractors	INX hazard reporting
	90 Day review of access card inactivity, then cancellation of inactive access cards	Site Security and Risk Management Plan (PID: 32302).
	Monthly Activity Report – e.g. number of uses / activity/ vehicle searches/ bag searches on entry and exit	Service Agreement with Emergency Services Provider.
	Random audits of Swipe Card usage and authorised use	Service Agreement with Emergency Services Provider.
Verification Process	CCTV Records (maintained on server) related to events are reviewed	Site Security and Emergency Services Manager
	Electronic Patrol Records – review of monthly reports	Site Security and Emergency Services Manager
	Access Control Software – Access Reports reviewed upon request and daily	Site Security and Emergency Services Manager

	Site Access and Induction Request Reports / Records, review and approve	Site Security and Emergency Services Manager
	Annual audit of Site Security Risk Management Plan (ID: 32302).	Site Security and Emergency Services Manager
	Monthly Activity Report from Site Security Contractor	Site Security and Emergency Services Manager
Target Performance	No instances of unintentional unauthorised access to the site where induction has expired or was not approved	
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Effectiveness and Escalation	2 reported intrusion onto Power Station site since closure in 2017	
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	Failures or non-conformances to the Site Access Control requirements would be raised by the Site Security and Emergency Services Manager to the Hazelwood Rehabilitation Project Director	