CRITICAL MINERAL CONSORTIUM

Submission to the inquiry into factors shaping social licence and economic development outcomes in critical minerals projects across Australia

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EXECUTIVE SUMMARY

The purpose of the Critical Minerals Consortium (CMC) is to conduct research and to provide advice to governments and industry on the development of a critical minerals industry in Australia.

Members of the Critical Minerals Consortium have conducted research, that is relevant to the terms of reference of the Standing Committee on Primary Industries' inquiry into factors shaping social licence and economic development outcomes in critical minerals projects across Australia. In this document, we summarize relevant key findings, focusing on the following.

Improving Economic Development Outcomes: The first challenge for governments seeking to support socially and economically sustainable development is to support the development of the critical minerals sectors that have the best chance of succeeding economically, and in understanding how to achieve economies of scale when critical minerals sectors are mainly of interest to small and medium enterprises.

Recommendations:

- Consider narrowing Australia's list of critical minerals, to better provide focus for government support.
- Use Bluecap (by extending its application for critical minerals projects) to assist in assessing regional economic viability of regional development of critical minerals opportunities.
- Tailor support to small and medium sized exploration and mining companies.
- Engage Monash University's Mutual Value lab on the potential for using cooperatives or mutuals to build efficient and competitive industry structures, where economies of scale imply one or a few industry players.
- Always include opportunity cost when considering the economic contribution of critical minerals projects, in the interests of good decision-making, and transparency.

Preparing for a climate resilient sector: Climate change is devastating the mining of minerals needed to fight it. A detailed review of company disclosures over the last 10 years has revealed that the copper and lithium sectors alone have lost of AU$3Bn billion from extreme weather events, mostly flooding.

Recommendations:

- Fund climate resilience research projects covering not just existing mines and infrastructure, but future exploration zones.
- Support the embedment of climate knowledge within the mining sector and provide climate resilience planning support to small and medium sized critical minerals miners.

ESG as a Competitive Advantage: Cleaner production of critical minerals can be a strategic differentiator for Australia's product for example when supplying Europe. Furthermore, it is obvious that cleaner critical minerals production will also engender greater acceptance of the projects within affected communities.

Recommendations:

- Cleaner production of critical minerals can be a strategic differentiator for Australia's product in global markets, as well as making projects more acceptable to affected communities.

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- Australia should take the lead locally and globally in transparent and effective ESG monitoring.

Tracking ESG Risks: When engaging with communities, it is important to understand the risks. Our research includes an ongoing study of rare earth elements projects in Victoria, which provides a methodological template for an ESG tracker for the Australian mining sector.

Recommendation: Support the CMC in the development of an ESG Risk Tracker, applicable to all Australian regions and minerals.

Repurposing land after mining: Although the focus of this inquiry is on the development of new critical minerals mines and production facilities, we would like to draw attention to research on mine closure. It is critical to define closure plans during the earliest phases of development, and closure success is often a critical aspect of social license. The questions that our research address include:

- Given many closed or closing mines in a region, what is the best way to determine the next use for each parcel of land?
- Historically, how have local councils been involved in decision-making for determining the next use for land after mining, and how can they contribute in the future?
- Can any of the closed mines be reactivated, or can their mine wastes be reprocessed, to provide valuable materials, including critical minerals?

Recommendations:

- Adopt best-practice principles in mine closure and post-mine land use planning, to improve the social and environmental performance of all mines.
- While some research has been conducted in these fields, there is a need for ongoing research.
- Involve local governments more in determination of the next use for closed mines and in planning next use of current and planned mines.
- Commission a scoping study to map out at a high level, the technological challenges and available solutions for remobilizing, reprocessing and re-depositing mine wastes, focusing on a few key minerals.

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1 INTRODUCTION

Members of the Critical Minerals Consortium have conducted recent research, which is relevant to the terms of reference of the Standing Committee on Primary Industries inquiry into factors shaping social licence and economic development outcomes in critical minerals projects across Australia. In this document, we summarize relevant key findings.

The purpose of the Critical Minerals Consortium (CMC) is to conduct research and to provide advice to governments and industry on the development of a critical minerals industry in Australia. The CMC brings together researchers from Monash, Melbourne, RMIT, Latrobe, Deakin, Federation, Tasmania, NSW and Queensland Universities, as well as the CSIRO, the UK's Critical Minerals Intelligence Centre, and industry.

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2 IMPROVING ECONOMIC DEVELOPMENT OUTCOMES

The first challenge for governments seeking to support socially and economically sustainable development is to support the development of the critical minerals sectors that have the best chance of succeeding economically, and in understanding how to achieve economies of scale when critical minerals sectors are mainly of interest to small and medium enterprises.

2.1 FINDING FOCUS

The federal government has determined Australia's list of critical minerals, by finding the intersection of the lists of critical minerals defined by other sovereign entities (USA, EU etc.), and the geological potential for these minerals in Australia. The resulting list is very long, comprising 31 minerals.[1] To give a better sense of how long this list is: It covers 52 of the 94 naturally occurring elements on the periodic table of elements (i.e. 52 out of the 94 different types of atoms that make up all matter on planet Earth).[2] Having such a long list doesn't help much in providing focus.

Australia's list is based in part on the USA's list of critical minerals. We note that the USA expanded its critical minerals list in 2025, with the application of a new methodology for determining minerals criticality (Nassar et al., 2025). We hope that this will not lead to an expansion of Australia's critical minerals list in the future, which would further dilute focus.

Recommendation: Consider narrowing Australia's list of critical minerals, to better provide focus for government support.

Some of the states are providing more focus. For example, the Victorian government has identified potential to mine antimony, bismuth, indium, lithium, nickel, platinum group metals, rare earth elements, rhenium, silicon, tin, tungsten and zinc. From that long list, the government has selected antimony and rare earth elements as the priorities.[3] There are several potential mines for antimony and rare earth elements, and the possibility to develop value-adding downstream processing to the supply chains. That makes sense for Victoria.

Western Australia has identified its key critical minerals midstream investments, and NSW has identified its priority (critical) metals. These are shown in Table 1 below. The table also includes the long critical minerals lists of other states and the Northern Territory, none of which are as explicit as Victoria, WA and NSW as to their priorities.

While states focus on what lies within their borders, orebodies don't respect those borders. For example, in Victoria, rare earth elements are found in *Wimmera-style deposits* (a type of heavy mineral sand deposit found in the Murray Basin, Australia, characterized by ultra-fine heavy mineral grains) Such deposits mostly occur in Victoria, but some are in Southern NSW. All governments should consider the benefits of enabling concentrate from Wimmera-style deposits in NSW, to be supplied to future REE processing facilities in Victoria.

[1] Australia's Critical Minerals List and Strategic Materials List | Department of Industry Science and Resources
[2] The list of critical minerals counts platinum group metals (6 elements) as one critical mineral, and rare earth elements (17 elements) as one critical mineral.
[3] Source: Victorian Critical Minerals Roadmap - Resources Victoria

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Table 1. Priorities and lists identified by the States and the Northern Territory

Australia's critical minerals list[4] and (global market size)[5]	Victoria's list and priorities	Western Australia's list and priorities (key midstream investments)[6]	NSW's list and priorities (critical metals)[7]	South Australia's list[8]	Queensland's list[9]	Northern Territory's list[10]	Tasmania's list[11]
Nickel (US$57bn)	✓	Priority	✓			✓	
Lithium (US$37bn)	✓	Priority	✓	✓		✓	✓
Titanium (US$26bn)			✓	✓	✓	✓	✓
Manganese (US$31bn)		✓		✓		✓	
Cobalt (US$17bn)		✓	Priority	✓	✓	✓	✓
Chromium (US$16bn)			✓		✓		
Niobium (US$9bn)			✓				
Rare-earth elements (US$6bn)	Priority	Priority	Priority	✓	✓	✓	✓
Magnesium (US$6bn)			✓	✓		✓	✓
Molybdenum (US$5bn)			✓			✓	
Fluorine (US$4bn)							
High-purity Alumina (US$4bn)		✓	✓				
Graphite (US$2bn)		Priority		✓	✓	✓	
Vanadium (US$2bn)		Priority	✓	✓	✓	✓	
Zirconium (US$2bn)			✓	✓		✓	
Antimony (US$2bn)	Priority		✓		✓		✓
Arsenic (<US$1bn)							
Beryllium (<US$1bn)							
Bismuth (<US$1bn)	✓		✓			✓	
Gallium (<US$1bn)							
Germanium (<US$1bn)							✓
Hafnium (<US$1bn)			✓				
Indium (<US$1bn)	✓		✓		✓		✓
Platinum-group elements (<US$1bn)	✓		✓				
Rhenium (<US$1bn)	✓		✓		✓		
Scandium (<US$1bn)			Priority				
Selenium (<US$1bn)							
Silicon (<US$1bn)	✓		✓		✓		✓
Tantalum (<US$1bn)			✓				
Tellurium (<US$1bn)			✓				
Tungsten (<US$1bn)	✓		✓		✓	✓	✓

[4] Source: Australia's Critical Minerals List and Strategic Materials List | Department of Industry Science and Resources
[5] Source: (Whittle, 2025a)
[6] Source: Page 8 in Western Australia's Battery and Critical Mineral Strategy 2024 - 2030
[7] Source: Intersections of the Australian list with NSW priority metals | NSW Resources
[8] Source: South Australia's Critical Minerals dashboards | Energy & Mining
[9] Source: Intersections of the Australian list with minerals listed on page 7 of Queensland Critical Minerals Strategy
[10] Source: Intersections of the Australian list with NT critical minerals in NT Critical Minerals guide | Resourcing the Territory
[11] Source: Page 11 in Tasmanian Critical Minerals Strategy

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A tool has been developed to help the federal government, state governments and the private sector to simulate and assess regional economic viability for any mineral, including critical minerals. It has been developed by CMC member Stuart Walsh from Monash University and Geoscience Australia. It brings together a wide range of geographic, geological and economic data, and enables economic assessment for individual mineral prospects and regions. The tool is called 'Bluecap' and it is available via the Geoscience Australia Bluecap webpage (Walsh et al., 2020).

Recommendation: Use Bluecap (by extending its application for critical minerals projects) to assist in assessing regional economic viability of regional development of critical minerals opportunities.

2.2 SMALL MARKETS AND SMALL MINING COMPANIES

The markets for Au-critical minerals are small: The sum of all global markets for Au-critical minerals is about US$260Bn – the same size as the global market for iron ore alone (Figure 1 below). So, the Au-critical minerals list is a very long list of small opportunities. Despite being small opportunities, we should pursue some of them in carefully selected groups (by mineral, by geography), for regional economic growth, and to produce the minerals that our trading partners need for their decarbonization, agricultural and defence needs.

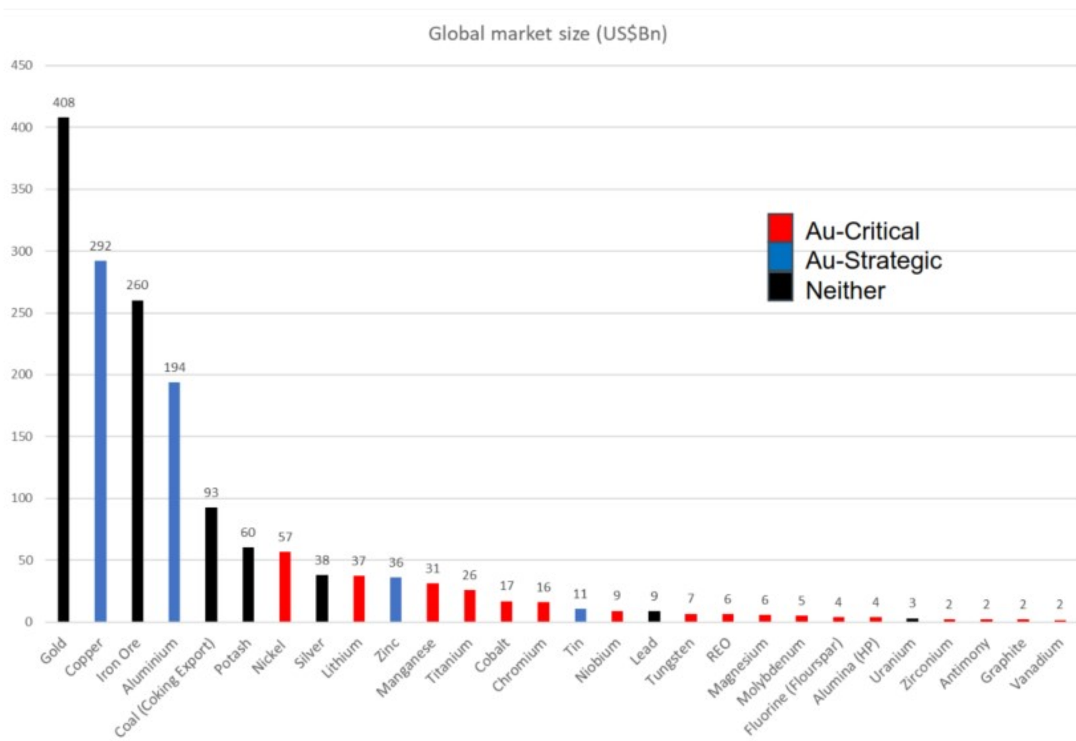

Figure 1. Estimated global market sizes for Australian Critical Minerals (Au-Critical), Au-Strategic and other minerals. Only markets >US$1Bn shown (Whittle, 2025a)

Large multi-commodity mining giants such as BHP (market cap US$177Bn) and Rio Tinto (US$148Bn) have some incidental interest in critical minerals, but by far most of their business is in very large markets, such as gold, copper, iron ore and coal.

In contrast to the multi-commodity giants, the largest critical minerals companies listed on the ASX are Lynas Rare Earths (US$14Bn) and PLS Group, formerly Pilbara Minerals (US$11Bn). The rest

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of Australia's producing and prospective critical minerals miners and explorers are much smaller, mostly with market caps in the $millions rather than $billions.

The implication for state governments, and the federal government, is that the support they provide must be geared to smaller players, which are individually less able to deal with complex economic, regulatory, social and environmental pressures. Governments must also determine how to develop market structures that can achieve economies of scale, somehow, despite being very small players.

There is a question as to whether governments ought to interfere in markets at all. However, many, including our present treasurer, believe that "markets built in partnership though the efforts of business, labour and government are still the best mechanism we have to efficiently and effectively direct resources".[12]

Recommendation: Tailor support to small and medium sized exploration and mining companies.

2.3 BIG ECONOMIES OF SCALE WITH SMALL COMPANIES

If it is small and medium-sized companies that are interested in critical minerals, can large economies of scale that are needed to be competitive in global markets, be achieved?

Consider Almería, Spain, which is home to a geographically small agricultural hub that conducts greenhouse farming in a desert (Figure 2 below). Despite its small size (0.01% of Spain's land area) and desert location, it produces 38% of Spain's horticultural output, with significant exports to Europe. The individual businesses growing vegetables are all very small, but collectively, they achieve productivity that outclasses much of the world. They achieve that with the use of mutual and cooperative structures (Giagnocavo, 2020).

Figure 2. Highly productive agricultural venture in Spain with many small operators and the use of mutual / cooperatives[13]

[12] Source: (Chalmers, 2023) acknowledging the contribution of influential economist Mariana Mazzucatto.
[13] Source: Greenhouses near El Ejido - Almería - Wikipedia (CC BY-SA 4.00)

Cooperatives work well in many circumstances in which many businesses require a shared service or capability, where economies of scale matter, and where the provision of the service or capability as a monopoly or monopsony would harm efficiency and competitiveness.

Cooperatives are already in use in the mining industry in Australia and are used extensively in Australia's agriculture sector. There is potential for cooperatives to be used to service the many critical minerals miners that face common problems, including:

- Downstream processing
- Supply and services
- Mine rehabilitation

It turns out that Australia is home to global expertise in the design and monitoring of mutuals and cooperatives. The world measures the performance of mutuals and cooperatives using systems developed by members of the Critical Minerals Consortium at Monash University. The University's Mutual Value lab is well placed to apply its expertise to the design of efficient industrial systems in the critical minerals sector (Adams et al., 2019).

Recommendation: Engage Monash University's Mutual Value lab on the potential for using cooperatives or mutuals to build efficient and competitive industry structures, where economies of scale imply one or a few industry players.

2.4 OPPORTUNITY COST OF DISPLACING AGRICULTURE WITH MINING

In Victoria, and in other states, valuable mineral resources are often discovered under agricultural land. This can be the source of friction between communities, governments and minerals as some in the community raise concerns about the loss of agricultural economic value. In dealing with this friction, it is useful to understand the 'opportunity cost' of mining.

An opportunity cost is the cost of an opportunity foregone. If minerals are to be mined from agricultural land, the agricultural activity must stop, at least until mining is complete, and the land is rehabilitated. In such cases, an interruption to agricultural economic activity, is an 'opportunity cost' of commencing mining economic activity.

Globally, mining generates around 120 times more economic activity per year per square kilometre compared to agriculture (Whittle, 2025b). Mining will also usually employ many more workers per square kilometre than agriculture.

These are global average results, and local results will vary. However, the results suggest that in most cases, the opportunity cost (loss of agricultural economic value) when mining commences, is very low in comparison to the economic value of mining.

Recommendation Always include opportunity cost when considering the economic contribution of critical minerals projects, in the interests of good decision-making, and transparency.

3 PREPARING FOR A CLIMATE RESILIENT SECTOR

Climate change is devastating the mining of minerals needed to fight it. A detailed review of company disclosures over the last 10 years has revealed that the copper and lithium sectors alone have lost AU$3Bn billion from extreme weather events, mostly flooding. The expected downtime from extreme weather is projected to increase further under climate change scenarios. Globally, these threats are expanding, including for extreme heat, as shown in Figure 3 below. Historically, the industry has taken a reactive approach to disruptions, yet compared to the potential scale of losses, modest investments into resilience planning and adaptation measures could save the industry significantly and provide Australia with a strategic advantage in delivering reliable supply. To support this, we need to embed climate knowledge within the mining sector, fund climate resilience research projects covering not just existing mines and infrastructure, but future exploration zones. This topic has been explored in detail by CMC member Tim Werner and his colleagues (Savige et al., 2025).

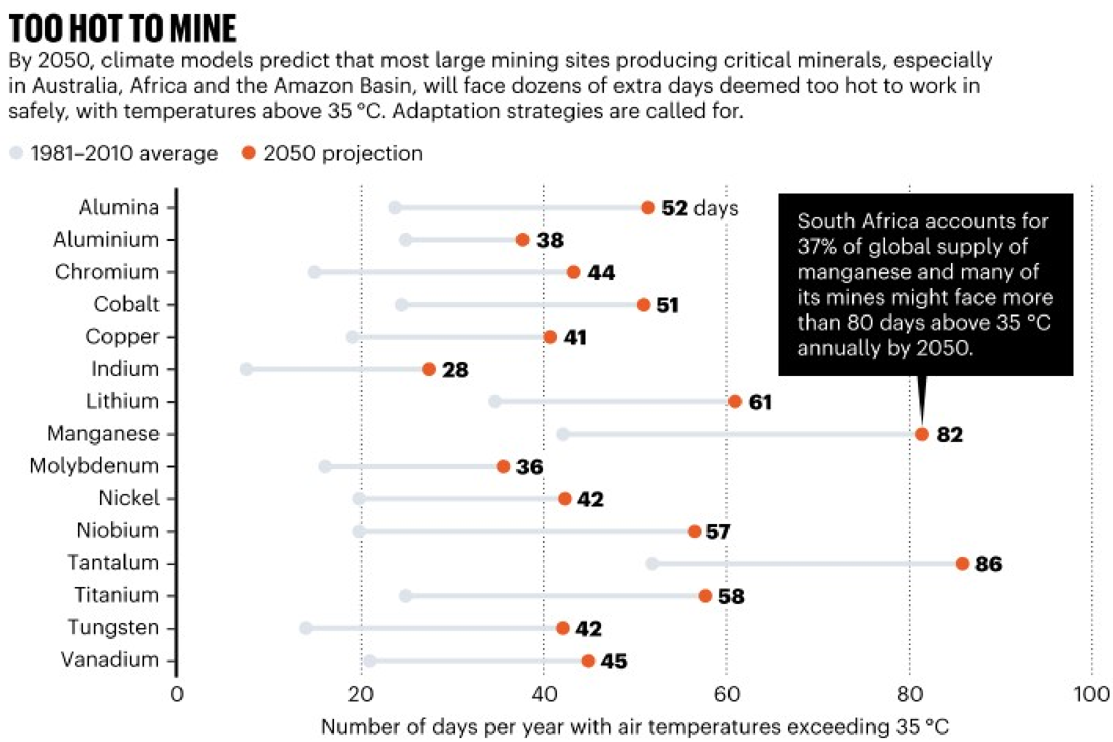

Figure 3. Increases in extreme heat days expected for mine sites producing a range of critical metals. Source: (Savige et al., 2025).

Given that the companies interested in critical minerals are medium and small-sized, and that preparing for climate change is a common problem, this suggests that shared or centralized support is needed.

Recommendations: Fund climate resilience research projects covering not just existing mines and infrastructure, but future exploration zones.

Support the embedment of climate knowledge within the mining sector and provide climate resilience planning support to small and medium sized critical minerals miners.

4 ESG AS A COMPETITIVE ADVANTAGE

Global ESG research has come across a frequent roadblock of limited data. Among the hundreds of thousands of mine areas visible in satellite imagery, less than half can be attributed to known sites in the Standard & Poor's SNL Metals and Mining Database, the premier source of information for industry-wide mine data. The inability to understand production values means we have limited basis for understanding the scale of potential impacts of a site. Beyond production data, we also have extremely limited reporting of ESG performance for most of the global mining sector. Research by Dr Tim Werner has shone a light on the critical data gaps inhibiting our ability to track and benchmark the performance of the sector (see Figure 4 below). It is essential that Australia takes a lead in demonstrating transparent and effective ESG monitoring. Core components of this are advancing the use of satellite data, moving beyond voluntary measures through mandating regular, open reporting of a wide array of environmental performance metrics (Maus & Werner, 2024)

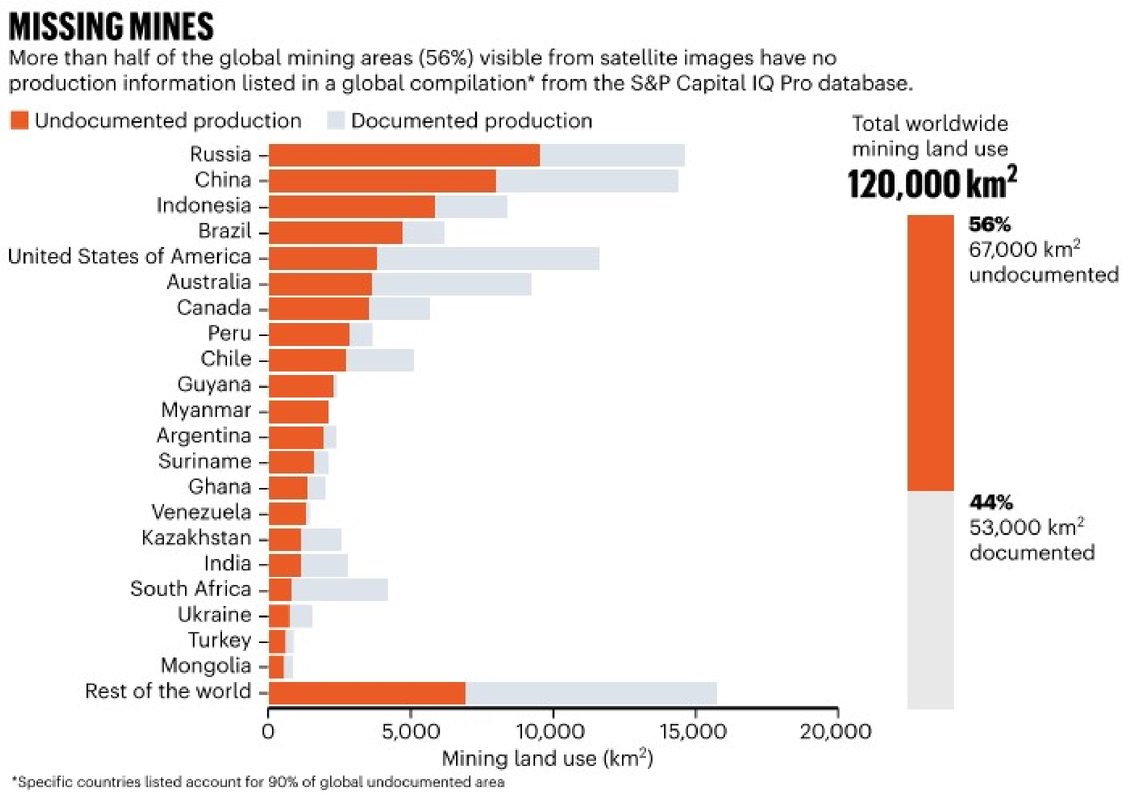

Figure 4. Demonstrates that even jurisdictions with better regulated mining industries still show major data gaps in key databases like the S&P SNL Metals and Mining dataset. These databases are central to ESG researchers that do not otherwise have the capacity to compile site-specific information. Source: (Maus & Werner, 2024)

In attempting to address some of these gaps through detailed, site-specific data compilation, Dr Werner also participated in research focused on a comparison of ESG performance between Australian and South American production of lithium (Orquera et al., 2025). They concluded:

- Australian production is well-regulated, however the carbon emissions of producing Spodumene-based lithium in Australia are generally higher than the brine-based alternatives available from Latin America. This complicates Australia's messaging around responsible sourcing.

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- There are opportunities for Australia to move downstream in the lithium supply chain, with lower-carbon production methods.
- Cleaner production of critical minerals can be a strategic differentiator for Australia's product for example when supplying Europe under the Batteries Regulations (EU) 2023/1542.

Furthermore, it is obvious that cleaner critical minerals production will also engender greater acceptance of the projects within affected communities.

Recommendations: Cleaner production of critical minerals can be a strategic differentiator for Australia's product, as well as making projects more acceptable to affected communities.

Australia should take the lead locally and globally in transparent and effective ESG monitoring.

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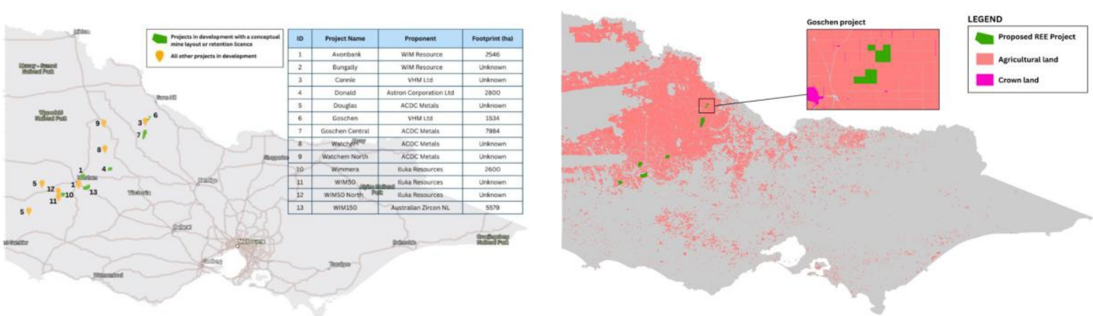
5 TRACKING ENVIRONMENTAL, SOCIETAL AND GOVERNANCE (ESG) RISK

The success of Australia's critical mineral industry is highly dependent on its ESG performance. As clearly recognised in the Critical Minerals Strategy 2023-2030, Australia's strategic advantage of offering responsibly sourced minerals to global markets is contingent on being able to measure and monitor performance against human and environmental metrics. Armed with strong knowledge of ESG risks, engagement with communities is also more productive, however efforts to track performance at a sector-wide level is often limited by the sheer number of mine sites with diverse geographies and reporting practices. Efforts have therefore advanced to transparently and independently map ESG performance across the mining sector. Members of the CMC have developed an internationally significant profile for mapping human and environmental risks in the mining sector. We illustrate insights from a local example, focusing on rare earth element projects in northwest Victoria as shown in Figure 5.

This research highlights that in environments where stakeholder interests diverge, there is a need for more integrated, accessible and digestible information on proposed developments. This research is a good example of how independent, quantitative research can help to inform decision-makers in government and the private sector, by serving as a starting point for more informed and objective discussions between proponents, decision-makers and mining-affected communities (Wong et al., 2026).



ID	Project Name	Proponent	Footprint (ha)
1	Avonbank	WIM Resource	2546
2	Bungally	WIM Resource	Unknown
3	Cannie	VHM Ltd	Unknown
4	Donald	Astron Corporation Ltd	2800
5	Douglas	ACDC Metals	Unknown
6	Goschen	VHM Ltd	1534
7	Goschen Central	ACDC Metals	7984
8	Watchem	ACDC Metals	Unknown
9	Watchem North	ACDC Metals	Unknown
10	Wimmera	Iluka Resources	2600
11	WIM50	Iluka Resources	Unknown
12	WIM50 North	Iluka Resources	Unknown
13	WIM150	Australian Zircon NL	5579

Figure 5. Projects under study and a draft risk map. Source: (Wong et al., 2026).

Based on the aforementioned research, and other research conducted by members of the CMC (Lèbre et al., 2025; Svobodova et al., 2020; Svobodova et al., 2019; Walsh et al., 2020), the CMC is well placed to develop an 'ESG Risk Tracker', to support ESG risk management different regions and commodities.

Recommendation: Support the CMC in the development of an **ESG Risk Tracker**, applicable to all Australian regions and minerals.

6 BEGIN WITH END IN MIND: REPURPOSING LAND AFTER MINING

Although the focus of this inquiry is on the development of new critical minerals mines and production facilities, we believe it is essential to draw attention to best practice principles and research relevant to mine closure and post-mining land use (PMLU). This is an important consideration for the social and environmental performance of any mine, over its complete lifecycle.

The questions that our research helps to answer include:

- Given many closed or closing mines in a region, what is the best way to determine the next use for each parcel of land?
- Historically, how have local councils been involved in decision-making for determining the next use for land after mining, and how can they contribute in the future?
- Can any of the closed mines be reactivated, or can their mine wastes be reprocessed, to provide valuable materials, including critical minerals?

The following subsections outline our research that in part addresses these questions.

Recommendations: Adopt best-practice principles in mine closure and post-mine land use planning, to improve the social and environmental performance of all mines.

While some research has been conducted in these fields, there is a need for ongoing research.

6.1 BEST WAY TO DETERMINE NEXT LAND USE

The first question is addressed by research that applies multi-criteria decision analysis (MCDA) to data gathered in a geographic information system (GIS). The research considers several factors in ranking many abandoned mines for a variety of different post-mining purposes. The benefit of the methodology is that it takes a systematic approach to decision-making for a large geographic area, rather than just considering each mine in isolation. In the research, we focused on abandoned mines in Victoria, and post-mining land uses of water supply, wastewater management, flood retention and solar energy generation. However, we can adapt the methodology to any region, and include mines that are expected to close in the future, and any number of potential future land uses (Giri et al., 2025). A sample of the results from this paper are shown in Figure 6 below.

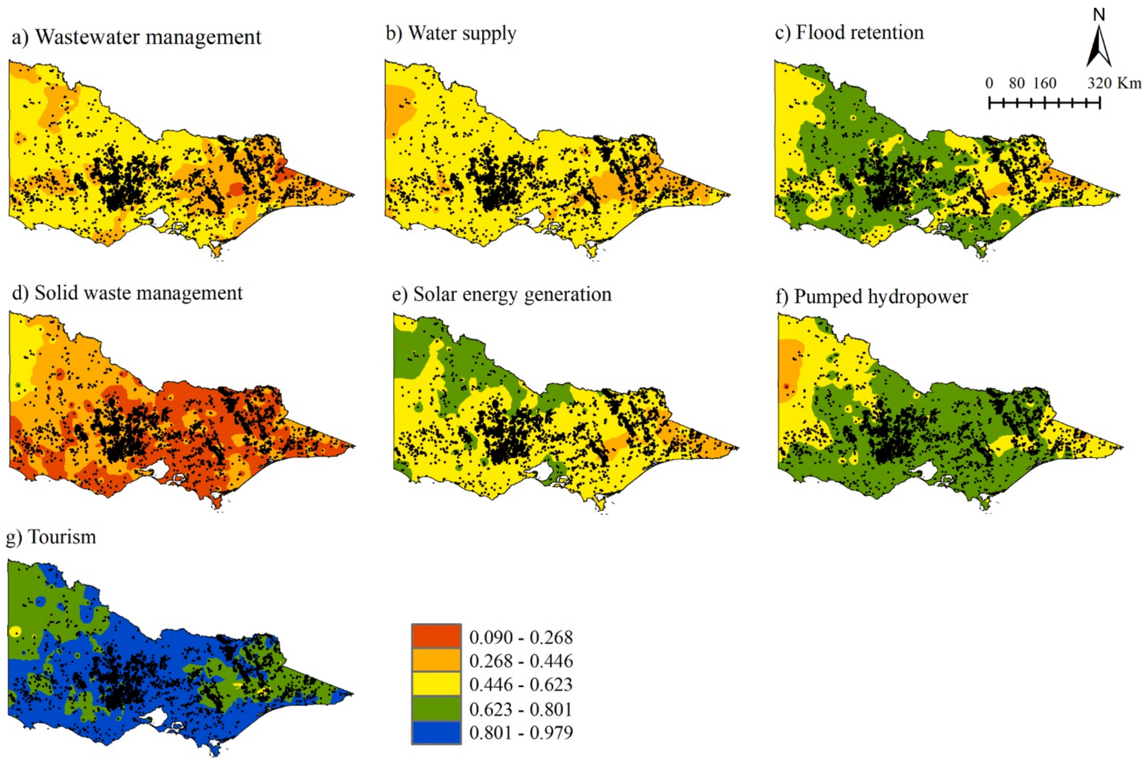


Figure 6. Comparative analysis of the suitability of each end-use option along with the positioning of all the mines/quarries under this study.

6.2 ROLE OF LOCAL GOVERNMENT IN PLANNING NEXT USE FOR CLOSED MINES

We have conducted research based on interviews of employees from several councils in Victoria, to determine their awareness and involvement in determining the next use for closed mines. The research identified opportunities to improve outcomes for communities through greater involvement of councils, though many presently lack the technical and human resources required to effectively engage in the process effectively (Tully et al., 2025).

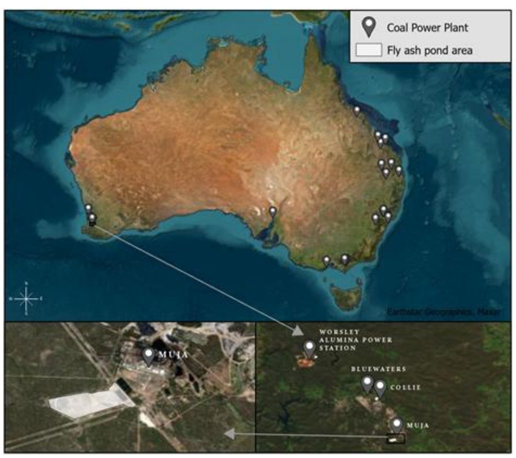
We did not include in the research consideration of next use planning for existing and planned mines. However, our hypothesis is that greater involvement of local governments in these areas could improve outcomes for communities.

Recommendation: Involve local governments more in determination of the next use for closed mines and in planning next use of current and planned mines.

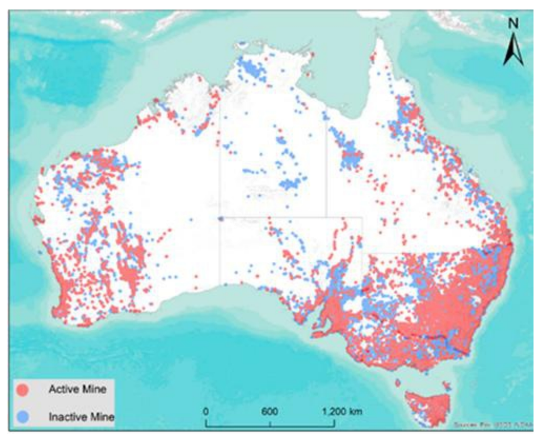
6.3 REACTIVATION OF MINES, OR REPROCESSING OF WASTES, TO PRODUCE CRITICAL MINERALS

The Australian landscape is affected by abandoned mines that pose environmental, public health and safety risks. To promote the beneficial reuse, rehabilitation and/or remediation of these sites and understand their spatial arrangement, we compiled, classified and analysed a country-wide geospatial database of all known inactive hard rock mine sites. Following extensive review and classification of disparate records of such sites that have been terminated, neglected or classified as heritage, plus those under care and maintenance in Australia, we assessed state-by-state reporting and cross-border rehabilitation requirements. This was enabled by the development of the Mining Incidence Documentation & Assessment Scheme (MIDAS) that can be used to catalogue and compare active or inactive mine data regardless of reporting conventions. At a national level, and with four case studies, we performed GIS-based spatial analyses and environmental risk assessments to demonstrate potential uses of our database. Analyses considered the proximity of sites to factors such as infrastructure and sensitive environmental receptors. As Australia struggles to manage the ongoing technical, socioeconomic and environmental challenges of effective mine rehabilitation, the insights enabled by this national-level spatial database may be key to developing coordinated responses that extend beyond state boundaries. Our classification and methodology are easily transferable, thereby encouraging more formalized, systematic and widespread documentation of abandoned mines worldwide. Figure 7 (right) below give an overview of the wide distribution of active and inactive mines across Australia (Werner et al., 2020).

Coal ash is one of Australia's biggest waste problems and accounts for nearly one-fifth of the entire nation's waste stream[14]. A 2025 study conducted by members of the CMC demonstrates how coal-derived residues rich in alumina, silica, and trace rare-earth elements can be transformed from high-risk waste into valuable feedstocks for the circular economy. The paper also provides new insights that underscore the broader socio-economic context: that rehabilitating legacy sites offer significant environmental, employment, and regional-development payoffs. Figure 7 (left) below give an overview of the distribution of coal ash ponds across Australia (Gupta et al., 2025).



Geo-locations of all coal power plants in Australia with ash pond area example (Gupta et al., 2025)



National overview of active and inactive mines across Australia, as identified within our database (Werner et al., 2020)

Figure 7. The spread of abandoned mines and ash ponds across the country

The reuse of coal ash is an example of secondary prospectivity. Further work on secondary prospectivity led by Geoscience Australia under the Exploring for the Future program further exemplifies how advanced geospatial mapping, mineral-systems analysis, and national data infrastructures can identify critical-metal enrichment in mine wastes across Australia. This resulted in creation of the Atlas of Australian Re-Mining Potential.

All the above is impressive work, but the work is by no means complete. Potentially, there is significant critical minerals value locked up in mining wastes, but much more research is needed to fully understand this potential. It is not only a question of determining what minerals are present in

[14] Source: Coal ash has become one of Australia's biggest waste problems — and a solution is being ignored - ABC News

mine wastes, but whether the technology exists, or can be developed, to economically extract the minerals, including redepositing the waste after processing, in an environmentally friendly way. Geoscience Australia is well placed to lead the analysis of what minerals are present in mine wastes but may not be the appropriate organization to lead the analysis of potential processing methods and economics. We propose a scoping study to map out at a high level, the technological challenges and available solutions for remobilizing, reprocessing and re-depositing mine wastes, focusing on a few key minerals.

Here is a great opportunity to turn long-term legacy sites into strategic assets while addressing environmental, social and governance issues cantered around these sites.

Recommendation: Commission a scoping study to map out at a high level, the technological challenges and available solutions for remobilizing, reprocessing and re-depositing mine wastes, focusing on a few key minerals.

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