

INQUIRY INTO BENEFICIAL AND PRODUCTIVE POST- MINING LAND USE

Organisation: CRC TiME
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Standing Committee on State Development
Parliament of New South Wales
state.development@parliament.nsw.gov.au

Dear Committee,

Inquiry – Beneficial and productive post-mining land use

The Cooperative Research Centre for Transformations in Mining Economies (CRC TIME) is pleased to contribute to the New South Wales Standing Committee on State Development's examination of opportunities, benefits, pathways and challenges relating to innovative post-mining land use.

We make this contribution as an organisation dedicated to better understanding and addressing the challenge of mine closure and post-mine transitions.

Our footprint and project portfolio are broad, reflecting the scale, diversity and impact of mining. Our partnership is also diverse, bringing together more than 70 mining and mining equipment, technology and services (METS), regional and community, government, research and other partners from across the nation.

While our presence in New South Wales has been limited to date, what we have learnt is relevant to improving outcomes for regional communities, industry and the state. We also continue to explore opportunities with partners for greater New South Wales engagement

More information about us is available at crctime.com.au.

Focus of this submission

Our portfolio covers various aspects relating to mine closure and post-mine transitions, including post-mining land use, regional economic diversification, finance models, policy and regulation, environmental stewardship and rehabilitation, First Nations leadership and participation and education and training.

This submission focuses specifically on work to help strengthen the evidence base and drive innovation relating to post-mining land use. It highlights key findings and emerging themes from research and projects relevant to the Committee. Work underway is signposted.

Links to full reports and associated resources are provided throughout.

Context

From our perspective, the Committee's inquiry represents an important milestone towards greater shared understanding of how, and under what circumstances, mined land and mining-related infrastructure can be repurposed for beneficial use.

It reflects a wider shift – nationally and internationally – in how the *process of closure* (that is, the end of mining operations) is understood. This includes greater awareness of the potential for mined land and infrastructure to support regional economic diversification, as well as environmental and other goals.

At a high level, we see gradual change from a focus on *what is being transitioned out of* (e.g. active mine operations) to *what is being transitioned into* (e.g. what's next).¹ Understanding how repurposing mined land and infrastructure, including the conditions need to achieve as well as risks and challenges, for what is *being transitioned into* is a key component of this.

This requires new ways of planning for and partnering for the end of active operations - and new ways of understanding what success looks like.

New methods are required for articulating and assessing the business case for transitions to productive post mine land use, recognizing and growing public and private sector investment opportunities. Opportunity also exists to leverage and capitalize from a forecast \$4 billion to \$8 billion annual spend on the national mine closure solutions industry.²

Among other system changes, this will require:

- ways to develop a shared vision for a post-mine future at a regional scale, drawing on an understanding of local values, strengths and capacity drivers.
- fit-for-purpose policy and regulation that manages risk to people, the environment and the state, respects First Nations rights and interests and supports regional opportunities.
- upskilling industry, community and First Nations organisations, government and other organisations so they have access to skills, knowledge and tools to support post-mine planning and realisation.
- methods to attract and support post-mine investors. It is likely to addressing issues such as access to relevant pre-competitive data and information, clarity about risk transfer and sharing approaches and novel tools for business case assessment.
- ways of measuring improvements in natural capital and ensuring agreed regional environmental and conservation goals can be met if mined land is to be used for new purposes.

Post-mining land use

Our [Post-mining land use](#) project was commissioned in 2021 to deliver one of the first systematic reviews of post-mining land use globally.

It considered mines and associated infrastructure as 'important regional assets' while seeking to learn from other instances of regional changes. Two final reports were produced, one on [repurposing of mined land and assets globally and one on the Australian experience](#).³

Post-mining land use was also discussed in a landmark 2023 report, '[Enabling mine closure and transitions: Opportunities for Australian industry](#)'. It highlighted a range of factors that enable and determine post-mining land use, including community values and expectations, residual risk, local skills and capabilities, location, final landforms and operational status (such as whether the site is operational or abandoned).⁴

¹ Cooperative Research Centre for Transformations in Mining Economies, [Foundations of post-mining transitions: Insights from our foundational research on transformations in mining economies](#), CRC TiME, Perth, Australia, 2023.

² See [Enabling mine closure and transitions: Opportunities for growth in Australian industry](#).

³ Beer, A., Haslam-McKenzie, F., Weller, S., Davies, A., Cote, C., Ziernski, M., Holmes, K., and Keenan, J (2022), [Post-mining land uses](#), CRC TiME, Perth Australia, p. 7.

⁴ P. 40.

Together, this work catalogued a range of factors for consideration in the context of responsible post-mining land and infrastructure use. These included:

- There is a vast and diverse range of examples of post-mining land and infrastructure use globally. Uses included for environmental conservation, tourism, administration and energy generation.
- There does not appear to be a consistent way of repurposing assets, with repurposing addressed on a 'one off' basis, creating high implementation costs.⁵
- Regulatory frameworks often have 'limited scope for consideration of alternate uses' due to focus on risk mitigation and site rehabilitation.⁶
- The role of leadership to envisioning and bringing together diverse parties to support change. Leadership can arise from various sources, including from communities as well as the private sectors.⁷
- How the nature of the mining industry, particularly the impact of commodity price cycles, can make it harder to identify and progress repurposing options.
- How limited understanding of the potential to reuse infrastructure, and the time required to plan when options are identified, mean that opportunities can be missed.⁸

The '*Post mining land uses*' project documented 11 Australian case studies, including the Kidston Clean Energy Hub, Queensland and Stawell Underground Physics Lab, Victoria. As noted in the report, some show success while others highlight challenges.

Other important project outputs included [a stylized set of gateways for mine site repurposing](#) and nine questions that may assist in understanding opportunities for mine site repurposing.⁹

Enabling factors

This section explores four enabling factors: policy and regulation, education and training, a shift from site to regional scale and values-based multistakeholder collaboration.

Policy and regulation

Addressing the gap between mine closure and regional development policy and regulation will be important for the Committee to consider.

Mine closure policy and regulation generally focuses on impact and risk minimisation and management, driven by legitimate and serious concerns relating to health, safety, the environment and communities. Avoiding liability to the state if mines and associated assets are not effectively 'closed' is another key objective.¹⁰

Additionally, return to prior state (usually native vegetation or for agricultural purposes) is largely accepted as the preferred outcome for mined land. Achieving this goal usually requires site rehabilitation and removal of physical and other assets.

⁵ Beer, A., Haslam-McKenzie, F., Weller, S., Davies, A., Cote, C., Ziemski, M., Holmes, K., and Keenan, J (2022), [Post-mining land uses](#), CRC TiME, Perth Australia, p. 6.

⁶ *ibid*, p. 6.

⁷ *ibid*, p.21.

⁸ *ibid*, p. 5.

⁹ *ibid*, p. 11.

¹⁰ Cooperative Research Centre for Transformations in Mining Economies, [Foundations of post-mining transitions](#), CRC TiME, Perth, Australia, 2022, p. 2.

On the other hand, regional development policy generally focuses on unlocking opportunity, including supporting economic diversification.

Realising post-mine land use is likely to require taking a pragmatic, flexible and adaptive approach to the formulation of site-based closure success criteria (or similar). Partitioning land for different uses and asset based planning for re-purposing infrastructure brings both spatial and temporal considerations that, under the right conditions, could support net benefit transitions. Attracting human capital is also likely needed to achieve positive outcomes.

A [review](#) of Queensland, Western Australian and Victorian regulatory frameworks noted that repurposing and social transitions (where closure is likely to significantly affect economic opportunity and social services) are emerging as concepts. However, as yet, there is not clear guidance on either.¹¹

Furthermore, [research](#) with the Queensland Government and enviroMETS identified more than more than 20 regulatory instruments that a proponent may need to navigate to secure necessary approvals for a new post-mining land use.¹²

We are scoping new research to add value to government considerations, including tenure principles and frameworks for post-mining uses and identifying global best practice residual risk transition models that enable net benefit. Post mining value assessment models could also inform business case development for assessing potential private-public partnerships.

Shifting from site to regional scale

Traditionally, mine closure is seen as proponent-led and site-focused. Return to prior state is usually the aim, with land to be rehabilitated and infrastructure removed. As noted, there are important reasons for this, including reducing risk of harm to people and the environment.

Yet, the social and economic impacts are usually felt at a regional scale. Options for broader investment to improve environmental outcomes at a regional level are also not investigated through site-based approaches.

Furthermore, various effects – environmental, social, cultural and economic – are generally interconnected and cumulative, especially in areas where multiple mines operate.

To help support regional scale approaches, work is underway to build evidence and demonstrate how regional-scale effects, impacts and opportunities can be identified and managed. This includes through the development of a framework, case studies, typology and guidance to enable [Regional Cumulative Effects Assessment and Management \(RCEAM\)](#).

Central to this will be identifying different governance models that build confidence and involvement in the process, including by First Nations and regional community partners.

Upskilling to support new opportunity

Improving the availability and accessibility of education and training for different groups has been identified as a priority by our partnership. This reflects:

- the need for First Nations and regional communities to be able to learn more about the mine closure and post-mine transition process, including opportunities,

¹¹ See Hamblin, L., Gardner, A and Haigh, Y, [Mapping the regulatory framework of mine closure](#), CRC TiME Limited, Perth, Australia, 2022.

¹² See enviroMETS (Qld), [Lighthouse Project 1: Post-Mining Land-use – Regulatory and Industry Practices](#), enviroMETS, Brisbane, Queensland, 2023.

challenges and models of post-mining land use. It is especially important to ensure First Nations and regional communities are involved in options identification and analysis and receive mutual benefit from activities.

- The need for a skilled workforce that can plan for different mine closure and post-mine transition options.
- The need for policy makers and regulators to have access to an up-to-date evidence base on leading practice across a range of dimensions.

Along with other organisations, we are undertaking a range of activities to help meet these needs, including:

- commissioning a world-first Mass Open Online Course on the Foundations of Mine Closure and Sustainable Transitions. More than 400 learners enrolled in the pilot course, with a certified option now in development. Learners ranged from industry professionals to policy makers and regulators.¹³
- supporting an Indigenous-led project to develop a suite of Vocational Education and Training (VET) options tailored to the preferences, priorities and needs of First Nations people and communities. Stages 1 and 2 are now underway.
- a strategic review of education and training options available as well as an analysis of specific needs by group. This will be released soon.

Multi-stakeholder processes and planning

Research confirms the importance of understanding local values to achieving net-positive post-mine transitions (where benefits outweigh costs).

Each community has its own set of values – what matters most to it. Values are locally-specific and dynamic, meaning that one community gives most important to will be different to communities in another region. Understanding local values, especially those held by Traditional Owners, takes time and investment in deliberation and relationship-building.

In the context of post-mine transitions, including post-mine land and infrastructure use, what is desirable must align with what options are feasible and viable.¹⁴

A [major project](#) in the Latrobe Valley is applying a deliberative and consensus-building process to identify options for mined land transition. Stage 1 brought together mine operators with community members, including Traditional Owners, government agencies and other groups to identify and consider potential post-mining options.¹⁵

Stage 2 is underway, with options developed during this process being considered through a second phase of deliberation, including by Traditional Owners, youth and a community panel.

Another project is developing innovative tools to for regions to undertake scenario planning. Pilots are planned for Bowen Basin, Queensland and Bell Bay, Tasmania during 2024.¹⁶

¹³ CRC TiME, [World-first Australian course addresses mine closure gap](#), CRC TiME, viewed 10 June 2024.

¹⁴ See [Understanding the values of stakeholders in Australian post-mining economies](#).

¹⁵ See [Regional development aspirations for the Latrobe Valley and Gippsland: Setting the context for post-mine land use planning](#) and [Collaborative planning for people navigating mine land transition: Progress in Australia's Latrobe Valley](#).

¹⁶ See [Project 1.8: Identifying future economic development pathways for mining regions and increasing transition capacity](#).

Opportunities for growth in Australia's mine closure solutions industry

As part of its examination, the Committee could consider how these opportunities interplay with the potential to grow Australia's mine closure solutions industry.

Research by CSIRO for CRC TiME found that almost 240 Australian mines are expected to end production by 2040, including 33 in New South Wales. Associated analysis estimated national expenditure on mine closure and rehabilitation activities as \$4b to \$8 billion annually.¹⁷

This presents a significant economic opportunity for Australian businesses delivering the diversity of equipment, technology and services required to deliver these activities. It may particularly do so for local, regional and Indigenous businesses.

The report, [*'Enabling mine closure and transitions: Opportunities for Australian industry'*](#) maps existing and emerging business opportunities across four categories, namely:

- Engagement and partnership, such as services, equipment and technology that enables effective engagement, co-design of post-mining solutions and strong partnerships. These include facilitation services and tools for engagement, governance, shared decision-making and partnerships.
- Waste reduction and resource recovering, including repurposing of mine wastes for new uses and technologies to recover minerals from minerals wastes.
- Mine rehabilitation, including equipment, services and technologies that address challenges relating to physical landform stability, hydrological systems, pollutant management and revegetation and biodiversity.
- Land use transitions, including repurposing of assets, such as for renewable energy generation.¹⁸

A range of enabling actions by government, industry and the sector are also identified. For governments, these included increasing visibility of opportunities and challenges to drive and support innovative partnerships, encouraging research and demonstration of solutions, reviewing of regulatory barriers to new and innovative opportunities and supporting mine closure solution provider capability and export opportunities.

Further to this, we are currently exploring how best to support growth of the sector.

Investments in projects examining critical operational challenges, such as climate-adapted seed sourcing, management and potential future use of pit lakes and prevention and management of acid mine drainage, will also support new opportunities.

Concluding remarks

The above represents a snapshot only of work underway across our portfolio, and with our national and global partners to help transform mine closure and post-mine transitions. Our work is contributing to a shift towards beneficial and productive post mining land, as well as infrastructure, use. Our publications library, including reports and resources, is available at crctime.com.au.

¹⁷ CSIRO, [*Enabling mine closure and transitions: Opportunities for Australian industry*](#), Prepared for CRC TiME, CSIRO, Canberra, Australia, 2023, vii.

¹⁸ *ibid*, pp. viii – ix.

We would welcome the opportunity to share more with the Committee.

If you require more information or we can help further, please do not hesitate to contact Jillian D'Urso, External Relations and Impact Director, at

Kind regards

Dr Guy Boggs

Chief Executive Officer

Cooperative Research Centre for Transformations in Mining Economies (CRC TiME)