

When best practice isn't enough: reframing mine closure through First Nations leadership

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Abstract

Research shows that effective and responsible mine closure and relinquishment examples in Australia are still limited and appropriate inclusion of First Nations people is underrepresented, despite ongoing efforts and the scale of the industry. Through the ongoing work of the Cooperative Research Centre for Transformations in Mining Economies (CRC TiME), our partners and our community, a vision is emerging for what Indigenous-led participation in mine closure might detail and the strategic pathways being developed.

The inconsistent First Nations inclusion in mine closure planning has had significant impact on First Nations people, flora and fauna, the environment and many traditional practices, which is of major concern today and requires attention to reduce further long-term impact and breach of rights.

Drawing on research from the CRC TiME, including a suite of co-designed, collaborative and co-managed projects with First Nations people, this paper examines emerging pathways for Indigenous participation in mine closure. These projects explore pathways for strengthening Indigenous leadership in mine closure, including the CRC TiME Restoring Country initiative, development of native seed supply chains, water and pit lake management, Indigenous enterprise participation and regional cumulative impact planning.

This paper argues that current 'good practice' approaches are insufficient to address the historical and ongoing impacts of mining on Country as they remain consultative rather than Indigenous led. Instead, a shift towards Indigenous-led, place-based closure frameworks embedded from the initial stage is required to ensure equitable, sustainable and rights-aligned outcomes in mine closure and post-mining transitions. Note that within this paper, the terms 'Indigenous', 'First Nations' and 'traditional owners' are interchangeably used to refer to Aboriginal and Torres Strait Islander peoples.

Keywords: mine closure transitions, best practice, guidance, First Nations inclusion, post-mining land use, early engagement

1 Introduction

Mine closure has emerged as a defining challenge for the resources sector in Australia. As global pressure intensifies around renewable energy, climate change, environmental rehabilitation and responsible resource extraction, governments and industry actors are increasingly focused on closure planning and post-mining transitions. This urgency is further amplified by commitments to net zero emissions and the anticipated scale of mine closures over the coming decades.

However, despite this heightened attention, mine closure does not occur in a vacuum. It unfolds within complex socio-cultural, ecological and historical contexts, particularly on lands and waters belonging to First

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Nations peoples. For many communities, mining has resulted in long-term environmental degradation, disruption to cultural practices, and enduring impacts on connection to Country and actualising self-determination. These impacts persist well beyond the operational life of a mine, raising critical questions about how closure is conceived, governed and implemented. This legacy of damage to Country continues to this day. Governments have advocated for change through native title legislation, bringing about agreement-making that has significantly contributed to Indigenous inclusion in rehabilitation of mined lands since the 1970s (O'Faircheallaigh & Corbett 2005). Despite this, the issues raised are still very relevant today, Traditional owners are not meaningfully engaged in the decision-making that occurs in resource development and the life of mine.

Decisions made during mining and closure planning shape land use, ecological recovery, economic opportunities and cultural continuity. Yet traditional owners, who are among the most affected stakeholders, are often still excluded from meaningful participation in these decisions, even though 'good practice' is followed and 'best practice' guidelines are readily available. An example of where regulatory and standard procedures using good practice guidance material and the legal permissions afforded to a mining company ultimately resulted in disastrous outcomes for Indigenous people is the case of Juukan Gorge in the Pilbara, Western Australia. This damage occurred with reconciliation action plans and other engagement protocols in place, demonstrating that a deeper understanding of the priorities of the community was lacking at this time (Fitch et al. 2026).

The term 'best/good practice' is frequently invoked across the sector, often with the implicit assumption that they mean the same thing and that such practice is underpinned by robust benchmarking and standardised approaches to engagement; however, they do differ in that good practice meets regulatory requirements as a minimum while best practice provides more leadership in quality engagement with Indigenous stakeholders, meeting their expected outcomes. As in fields such as health and education, the application of universal standards across diverse contexts remains highly problematic, particularly when those standards are grounded in Western, colonial paradigms that may not adequately reflect or accommodate alternative knowledge systems and ways of being (Finn & Brown 2024).

While mine closure is everyone's business, the Cooperative Research Centre for Transformations in Mining Economies (CRC TiME) is funded to address the present challenges and poor track record of closure and transitions. The CRC TiME is more than halfway through what it was funded to do, and the research generated is laying the foundation for what is to come in the next 5 years. The framework and partnership model is shaping up to be positive for appropriate First Nations inclusion to expand across the mine closure requirements and be embedded in decisions, however, what this looks like in practice is still unknown. These developments raise considerable concern; current efforts may not be sufficient to prevent repeats of past failures, especially if the voice of First Nations communities is not at the forefront of closure, bearing weight for effective decision-making between now and 10 years' time. If activity doesn't change, will the Indigenous business sector be in a position to capitalise on opportunities in closure transitions?

This paper examines these challenges through the lens of research conducted by the CRC TiME. It explores the limitations of current best or good practice approaches and argues for a transition toward Indigenous-led models of mine closure. In doing so, it addresses 3 key questions:

1. Why does current closure practice fall short of delivering equitable outcomes for First Nations peoples?
2. What structural barriers limit meaningful Indigenous participation and leadership?
3. What emerging models and approaches demonstrate pathways toward more effective, Indigenous-led closure frameworks?

2 Methods

This paper adopts a qualitative interpretive approach combining literature review with a synthesis of findings from multiple CRC TiME projects conducted between 2020 and 2026. These projects include co-design, co-led,

collaborative initiatives with First Nations partners across domains such as restoration, post-mining land use and regional planning. The analysis focuses on identifying recurring structural barriers, emerging models, and patterns of participation and inclusion. It also builds on the priorities explored in Boggs et al. (2025).

3 Background

3.1 Mine closure and its evolving context

Mine closure has historically been treated as the final stage of the mining life cycle, often characterised by minimal rehabilitation, limited long-term planning and insufficient resources. In recent decades, however, there has been a shift towards integrated closure planning, with frameworks emphasising early consideration of closure outcomes, stakeholder engagement and sustainable land use (International Council on Mining and Metals 2025). Despite this shift, research indicates that closure outcomes remain complex and unbalanced. Many sites continue to exhibit environmental risks, including contamination, biodiversity loss and unstable landforms. Social outcomes are similarly inconsistent, with communities often experiencing economic decline and limited post-mining opportunities. For example, Mary Kathleen uranium mine in Queensland ceased operations in 1982. It was said to be rehabilitated, however, further environmental impact studies demonstrated significant impact to nearby ecosystems (Pinnacle 2023). Mines are often registered as ‘closed’ but recorded in databases as being under ‘care and maintenance’, giving conflicting information to, and interpretation by, stakeholders (Measham et al. 2024).

Examples such as this drive the need for a closer look at what ‘closure’ means, especially when we have witnessed the sector’s recent fast-tracking of mining approvals. Fast-tracking to capitalise on the demand for critical minerals in addressing technology expansion is common and, with this urgency, mistakes are inevitable (Unger et al. 2025). Besides the room for error with urgent approval processes is a deficit in what closure means. The language in closure needs to be understood as it appears vague and open to interpretation (Measham et al. 2024).

Though there has been significant focus on mine closure in recent years, there are polar opposite examples of successful mine closure and relinquishment (CSIRO 2023). A mine closure and development proposal to the Western Australian Government requires closure management strategies that minimise ‘adverse’ environmental impacts and provide mitigation for risk, the closure outcomes, monitoring and after-completion activities [Department of Mines, Petroleum and Exploration (DPME) 2025]. The department acknowledges that there will be knowledge gaps and stakeholder engagement needs to be recorded. However, this rarely translates into decision-making power or holding to account those who fail to fulfil this requirement.

Closure must address the overall damage that exploration has developed, and where rehabilitation outcomes can allow restoration of cultural practices and healing of the site. These processes warrant further improvements in closure planning to avoid costly mistakes so that a balanced closure approach leads to improved outcomes for environmental sustainability, cultural integrity, community health and safety, and legacy (ICMM 2025). This includes community participation in planning and decision-making that is transparent and informative at the onset and leads to the reduction of risk and better outcomes overall (ICMM 2025). It includes understanding values and perspectives, and ensuring Indigenous people are given the opportunity for free prior and informed consent (FPIC), access and benefit sharing, and mutually agreed terms reflected within agreements on post-mining land uses (Measham et al. 2024). As Indigenous people navigate mine closure, Indigenous leadership is needed to foster better outcomes by awareness and participation in decision-making governance. As an example of initiating an innovative approach to changing the context of mining closure, within the CRC TiME we are developing educational programs in collaboration with the vocational education and training, and tertiary, sectors for mine closure programs to educate communities and build greater skills that contribute to more Indigenous leadership in this sphere.

3.2 Indigenous participation in closure planning

The inclusion of First Nations peoples in mining has been widely discussed across disciplines, often highlighting the lack of appropriate and meaningful engagement in key decisions on closure planning. Researchers such as Ciaran O'Faircheallaigh, Rodger Barnes and Sarah Holcombe highlight that participation is often constrained by power imbalances, institutional structures and differing worldviews that often fail traditional owners. Engagement processes frequently fail to move beyond consultation or communication for compliance, thereby limiting the ability of First Nations communities to influence decision-making. This is particularly problematic in closure, where decisions have long-term implications for land, culture and livelihoods (Measham et al. 2024).

Indigenous people have been excluded from decisions on closure since the 20th century and the fight to be heard continues (O'Faircheallaigh & Corbett 2005), yet appropriate participation can identify key cultural values that are significant to the outcomes of site closure and rehabilitation. Cultural values and the role of traditional owners in closure planning and site rehabilitation should not be overlooked as First Nations cultural and environmental values often align (Kemp et al. 2023). An example of how First Nations involvement through leadership opportunities in mine closure and transitions can lead to closure leadership is a Canadian case studied by Christoffersen et al. (2019), demonstrating that communities can participate meaningfully in high-level technical decision-making processes given the opportunity and access to shared technical information. This approach promotes the move beyond consultation towards co-design and self-determination in closure planning.

Another example of this approach is outlined in Domadgee & Holcolombe (2025), which demonstrates that effective engagement in mine closure is relational rather than procedural. Best practice requires enduring relationships built on shared decision-making that views closure as a process of self-determination. Participation in closure decisions provides insight on what matters to Indigenous people in the area and how the health of the landscape can provide a continuing connection to culture. Place-based research provides guidance on how decisions could be conducted to align with a diversity of values, including opportunity for different opinions, truth-telling and space for leadership in co-designed outcomes (Measham et al. 2024). Recognising Indigenous ecological knowledge and its intersection with cultural values is good practice that should happen prior to the approval of plans and agreement-making (Kemp et al. 2023). Without this first step the closure outcomes will not align with the expectations of the community. Despite the available resources to guide and support good practice models, Indigenous participation still is viewed as peripheral.

3.3 Rights-based frameworks

The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) establishes the principle of FPIC, affirming the rights of Indigenous peoples to participate in decisions affecting their lands and resources. While widely endorsed, its implementation within mining contexts remains uneven (United Nations 2007). This gap between policy and practice underscores the need for approaches that move beyond compliance towards genuine partnership and leadership.

3.4 Co-design and Indigenous knowledge systems

Co-design methodologies have gained prominence as a means of addressing power imbalances and incorporating diverse knowledge systems. Drawing on the work of Linda Tuhiwai Smith and others, co-design emphasises collaboration, respect for Indigenous knowledge and shared decision-making (Smith 2012).

Co-design takes more time than is realistic for project timelines, however, co-design requires spending time to communicate, building the capacity to communicate without time constraint and in a respectful manner (Kemp et al. 2023). In the context of mine closure, co-design offers a pathway for integrating cultural values, ecological knowledge and community priorities into planning and implementation. Participants in a study on mine closure values recognised that closure needs to be adaptive, reinforcing mutual benefit and including greater multistakeholder participation; essentially, a net positive outcome (Foran et al. 2022).

What works is Indigenous-led governance inclusive of Indigenous researchers' having drawn on a decolonising lens to change the status quo; however, this takes resources and capacity building which is not always included in the agreement-making (Marsh 2013). The Gelganyem Group example shared at the previous Mine Closure Conference in Sweden and the recent Restoring Country webinar by the CRC TiME elaborates on this point of co-design and Indigenous-led governance. First Nations involvement early in closure planning is critical for success (Reeves et al. 2025a).

3.5 Limitations of good or best practice

As highlighted, other disciplines have studied the terms best practice and good practice and how they are applied in various contexts. A dictionary definition of best practice is 'a procedure that has been shown by research and experience to produce optimal results and that is established or proposed as a standard suitable for widespread adoption' (Merriam-Webster 2026). It is essentially a recipe that requires specific ingredients that, used in the right manner, produce the expected outcome. Good and best practice are often used interchangeably, particularly in government policy, and include the assumption that everyone has the same understanding of their meanings (Coffield & Edward 2009).

In the educational research disciplines, despite significant studies conducted on how best practice is defined, there is still a lack of consensus on the definition and conceptualisation of what is (Peters & Heron 1993). As stated by Manero et al. (2021), the academic literature on best practice doesn't necessarily reach the field practitioners on the ground completing the work; however, within the industry there are signs of good intent. The challenges for not only operators, but for all, is to decide what they are using as good practice as a minimum, or as best practice and leading the industry in mine closure. Intent requires follow-through, persistence and a genuine building of trust, which take time, as the basics of implementing good practice.

According to research, very few Australian sites have achieved successful closure regardless of academic studies completed that offer best practice closure criteria which is readily available (Manero et al. 2021). The implementation of best practice standards mentioned in academic studies by field workers is sporadic. Even academia has limitations on the use of cultural lens into this important work. For example, the 'Mine Completion criteria defined by best practice: A global meta-analysis and Western Australian case studies' conducted a thematic analysis of 58 studies and identified 10 best practice criteria for mine closure, however the importance of First Nations involvement was absent (Manero et al. 2021).

Some mining operators are inclusive of cultural values and are leading with examples of closure planning within a consultative framework, however, the majority still view closure from a Western, technologically focused viewpoint (Kemp et al. 2023). This is where good practice still fails to deliver the outcomes, particularly in terms of satisfaction for all stakeholders. Even though the good practice operators are active in improving practice, there remains limitations on what those cultural values can achieve in restoration and other domains due to the damage left from exploration (Kemp et al. 2023). The conformity to good practice measures is an individual responsibility and, notwithstanding the development of guidance such as the ICMM Integrated Mine Closure Good Practice Guides, adherence is difficult to monitor and control.

Another factor contributing to these limitations is that the closure principles are general in nature, making their application inconsistent across implementation due to the diversity of the site and the activity that has taken place (ICMM 2025). In essence, good practice efforts are evidently lacking in governance and detail.

4 The CRC TiME: elevating the scale at which research and decision-making occur

A number of research initiatives led by the CRC TiME between 2020 and 2026 were analysed to extract some key lessons that contribute to the argument for improvements in mine closure and transitioning, and to assist in strategies for the next 5 years.

4.1 Restoring Country initiative

The Restoring Country webinar series aimed to elevate truth-telling from a First Nations perspective on mine closure and participation in the sector. The pilot was an initiative by the CRC TiME in collaboration with The University of Queensland's Centre for Social Responsibility in Mining (CSRMI). Via webinar discussion and workshop activities, an understanding of current practice perspectives and ongoing challenges was realised. The challenges focused on understanding the real-life examples that give awareness to a process that is still 'not right' in terms of outcomes for Indigenous groups after mining ends. It touched on training initiatives and gaps in the on-ground practice despite closure plans and reconciliation action plans (Barnes et al. 2025).

The work showcased some examples of where improvement in practice and policy is needed, including:

- acknowledging that often the interests of mining companies are driven by commercial performance, which is a misalignment with Indigenous rights, values and responsibilities for culture and Country
- more consistent collaboration at the beginning stages rather than tokenistic gestures by companies, which often is reflected in the final outcomes, and preparedness for a change in mindset and a holistic view to achieve positive outcomes
- recognition that a community changes over time, and flexibility and keeping track of commitments is required. Collaboration among government and multistakeholders achieves better lasting results
- sharing data and information at an early stage and throughout the project to aid in relationship building and trust creation
- showing positive steps to invest in cultural awareness and appreciating that cultural healing takes time, and that mine closure can trigger grief and loss (Barnes et al. 2025).

This initiative reflects and supports what we were hearing from communities through various activities to understand the discrepancies in practice and what we set as priority areas to bring about change. The CRC TiME's First Nations Inclusion Strategy, the Foundations of Effective Indigenous Inclusion report and Prioritisation Plan point to the need for building trust, co-design, ensuring cultural legitimacy, governance protocols for engagement, and decision-making that supports social and economic benefits for Indigenous communities (Miller-Sabbioni et al. 2023).

4.2 Projects in development

To date, pit lake management and assessment in Australia needs guidance to inform modelling, closure risk and re-use tools, guidance on data monitoring, prediction and risk screening. Categorising stakeholder and rightsholder values to facilitate delivery, evaluation and monitoring of cost-effective and ethical outcomes and impacts is still being developed. However, pit lakes have been a mine closure result for the past 100 years. With over 1,800 open pits in Western Australia alone (McCullough & Lung 2006) and over 2,400 in Australia (Sagar et al. 2025), it is evident that the industry is lagging in terms of good practice.

Pit lake research demonstrates that regulatory and community expectations are not aligned and that better sustainable planning and management is minimal (Vandenberg et al. 2022). To approach the problem, the CRC TiME has invested AUD 5 million to enable better pit lake management and water re-use through modelling, analysis of community aspirations and development of decision-making tools. CRC TiME research has identified that the community is rightly concerned about cumulative impacts of multiple water bodies throughout the mining landscape on First Nations lands and has prioritised non-polluting and acceptable water quality as a key outcome for closure planning. This project in development aims to set the standard as an emerging model and approach to demonstrate pathways towards more effective, Indigenous-led closure frameworks and decision tools.

Another project in development is the Accelerating Indigenous enterprise growth in the mine closure industry: An Indigenous supply chain study, which is an Indigenous co-designed project aiming to map the

size, scale, capability and aspirations of Indigenous enterprises across Australia to strengthen First Nations participation in the mine closure and post-mining services. This project builds on the on the Enabling mine closure and transitions: Opportunities for Australian industry' report, which estimated the delivery of mine closure to provide economic opportunities of between AUD 4 to 8 billion annually (CSIRO 2023). This co-designed project is an example of leading practice in engagement and increasing Indigenous participation in both economic and environmental activities.

The supply chain study is a partnership with Aboriginal Enterprises in Mining, Energy and Exploration and the CSRM. It surveys the Indigenous business sector to better understand the interest in expanding to provide services in mine closure and the current capability and capacity to take up opportunities which facilitates progress towards addressing 2 of the key questions this paper highlights: 'What structural barriers limit meaningful Indigenous participation and leadership?', and 'Will they be in a position to capitalise?'

The regional cumulative assessment and management project investigates this question further.

4.3 Regional cumulative effects planning

Contributing to the research on planning for mine closure and holistic perspectives to shape policy involved stages 1 and 2 of the Regional Cumulative Assessment and Management (RCEAM) framework; systematically and comprehensively incorporating Indigenous knowledges, particularly in the context of mine closure in Australia. Through an extensive review of international best practices and literature, as well as yarns (Indigenous Australian term for conversation) and interviews, it lays the conceptual foundation for an Indigenous RCEAM (I-RCEAM) framework (stage 3) grounded in Indigenous values and principles. The study also identified the most significant opportunities and ongoing challenges to implement it in Australia. Unlike existing approaches that limit Indigenous involvement to consultation at a local scale, this focused on creating a 'shared space' at a regional scale and collaborative governance. The roadmap delivers on more inclusive and culturally responsive outcomes in Australia's transition away from mining (Tardin-Coelho et al. 2026). Backed by successful international models, particularly from Canada, the roadmap brought to the forefront Indigenous leadership within mine closure and transitions, and has strength when supported by internal governance capacity, (though it may need funding support to be realised), co leadership arrangements, legislation and trust-based partnerships. The study highlighted that voluntary consultative efforts by industry are insufficient without reinforcement by legal mandates (Tardin-Coelho et al. 2026). Stage 3 proposes an I-RCEAM framework 'two-eye seeing', (viewing through different worldviews i.e. Indigenous and Western) offering a transformative model for regional planning and mine closure in Australia that hopefully addresses some of the disparities in decision-making.

4.4 Post-mining land use

One emerging model and approach that has demonstrated pathways to effective decision-making and collaboration on mine closure outcomes took place in the Latrobe Valley, Victoria, Australia. It included developing a shared understanding and visioning using a model that allowed mine operators, traditional owner organisations, government and community to explore real options on closure through a structured process. Lasting outcomes and relationships were achieved through the CRC TIME project Collaborative planning for post-mining development in Latrobe Valley. This research took a values-oriented and community-led approach to achieve a way forward for successful rehabilitation, closure criteria and post-closure vision that was inclusive of the whole community; balancing the power dynamics and understanding of values and drivers from all domains (Reeves et al. 2025b).

Deliberate space making and planning saw a youth-designed summit, Indigenous reference group and community panel which enhanced connectivity and represented a genuine effort to appreciate and record community sentiment on post-mining in the Latrobe Valley (Reeves et al. 2025b).

4.5 Native seed initiatives

The CRC TIME has 2 ongoing national projects on seeds, 4.6: Evidence for effectiveness of climate adapted seed sourcing strategies for restoration success and transition to mine closure in a changing climate, and 3.13: Australian seed scaling initiative. Project 4.6 tests the short- and long-term performance of different provenance strategies in 5 different mining regions under 5 different climates: in a very dry environment in the Pilbara, under a Mediterranean climate in the region of Perth, in subtropical Queensland, in a temperate to dry climate in South Australia, and in a colder and wetter environment in Northern Tasmania, allowing for site-specific insights and comparisons across ecosystems and restoration contexts to develop broader guidance for industry and practitioners. Project 3.13 has been looking at how to improve the efficiency of plant establishment in large-scale, seed-based mine site rehabilitation. It focuses on assessing the effectiveness of technological developments made through a decade of research in the Pilbara region when applied to other mining environments: specifically, jarrah forest mining rehabilitation. Seed enhancement technologies and innovative engineering solutions to direct seeding that are compatible with existing mining machinery are being tested. Our third initiative will look at fulfilling the CRC TIME's commitment to effectively engaging with First Nations communities in the regions where CRC TIME research trials are happening, and regional workshops are being planned to understand the native seed supply chain and demand gaps.

Rather than viewing engagement as consultation, these native seed initiative projects can demonstrate collaborative research. By recognising Indigenous knowledge as evidence, building local capacity and developing long-term partnerships, mine closure can generate outcomes for Indigenous social and economic benefits and Indigenous participation can be embedded in closure processes.

5 Discussion

This paper set out to examine how mine closure and closure criteria practices in Australia can be reframed to connect with humanistic elements through stronger and more meaningful inclusion of First Nations leadership. The findings reinforce a growing body of literature that suggests that while industry standards for closure planning have improved, they remain predominantly technical, compliance driven, and insufficiently responsive to Indigenous perspectives, governance systems and long-term aspirations.

A key insight emerging from this research is that best 'practice closure', defined by regulatory sign-off and short-term risk mitigation strategy, often fails to deliver outcomes that are socially, culturally and environmentally acceptable or sustainable from First Nations perspectives because it often lacks a First Nations view and UNDRIP priorities. This disconnect reflects deeper structural issues, including asymmetries in decision-making power, minimal recognition of Indigenous knowledge systems and procedural rather than meaningful engagement. While many organisations demonstrate intent through consultation processes, these are frequently constrained by project timelines, staff turnover and predetermined closure criteria.

Importantly, the findings suggest that First Nations leadership is not simply an add on to existing closure frameworks; instead it requires a fundamental shift in how closure is viewed. Rather than viewing closure as an end point, First Nations perspectives emphasise continuity of land stewardship, cultural connection and intergenerational responsibility. These reframing challenges dominate industry and call for closure processes that are adaptive, place-based and co-designed from the outset of a project's life.

The research also highlights the importance of governance arrangements that enable genuinely shared decision-making. Examples of emerging models demonstrating pathways towards effective First Nations-led frameworks and meaningful engagement principles, such as the CRC TIME's and the CSRM, the Restoring Country webinars and report, and the collaborative approach example in the Latrobe Valley project (as identified within this paper), indicate that where First Nations groups are involved early and resourced appropriately, closure outcomes are more likely to reflect locally defined values and priorities. However, successful examples remain limited and often depend on individual organisational champions rather than systemic change. This suggests a need for stronger institutional mechanisms, such as the reform of policy and regulation, agreement-making and accountability.

Overall, we know closure practice is still inadequate, and there are often structural and policy barriers that create uneven power dynamics for First Nations people in the mine closure and transitions space. Current practice is changing and adapting to positive examples, and the industry is learning from negative examples of why it is important to rethink process and policy. Inclusion of First Nations people has progressed positively towards a more collaborative model that recognises the rights and aspirations of the community, however, this progress is still significantly behind where it can be termed good practice. While there are some operators using true co-design, others are failing to implement and, overall, Australia is falling short of successful closure and transition outcomes.

Research shows that effective outcomes and successful closure is achievable with Indigenous-led governance, co-design and inclusion from the beginning stages, and we refer to projects such as the collaboration in the Latrobe Valley as leading the way. Emerging models such as this, the RCEAM project within the Pilbara and the pit lake project collaboration, and the application of decision-making tools, are paving the way towards more sustainable, effective closure outcomes that are inclusive of First Nations people.

We note that structural barriers limit meaningful Indigenous participation and leadership, and key initiatives such as the Restoring Country webinar series highlighted the measures that are needed, such as investing in capacity building, time and resources for relationship building, and having open dialogue where challenges can be addressed. More space is needed for open and honest discussions to find equitable solutions that can be long lasting.

6 Conclusion

This paper has argued that current approaches to mine closure in Australia are insufficient to meet the expectations and rights of First Nations peoples, despite increasing recognition of the importance of Indigenous engagement. Through examining the limitations of existing practice and highlighting emerging examples of more inclusive approaches, such as research conducted by the Cooperative Research Centre for Transformations in Mining Economies, the research demonstrates that a reframing of closure is both necessary and possible.

Central to this reframing is the recognition of First Nations leadership as not being peripheral to closure planning and implementation. Embedding this leadership requires a shift from consultation to co-design, and from short-term compliance to long-term stewardship, to reflect the cultural, social and ecological values of the land.

While there are promising signs of change within the industry, progress remains uneven and is often dependent on voluntary action. To move beyond isolated examples requires stronger alignment between industry, government and First Nations. This includes regulatory frameworks that mandate early and ongoing engagement, mechanisms to support Indigenous governance and capacity, and accountability measures that ensure closure outcomes are both equitable and enduring.

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References

- Barnes, R, Keenan J, Williams C & Hamilton, B 2025, *Restoring Country: Exploring Indigenous Led Participation in Mine Closure and Environmental Services: Report on the Collaborative Webinar Series*, CRC TiME Ltd, Perth.
- Boggs, G, Measham, T, D'Urso, J & Kelley, B 2025, 'Enabling change in mine closure: six key challenges and strategies to enable transition planning, management and execution', in S Knutsson, AB Fourie & M Tibbett (eds), *Mine Closure 2025: Proceedings of the 18th International Conference on Mine Closure*, Australian Centre for Geomechanics, Perth, https://doi.org/10.36487/ACG_repo/2515_12

- Christoffersen, L, Reinecke, S, Shoesmith, M, McKennirey, E, Pilgrim, L & Rae, D 2019, 'Innovative community engagement for the quantitative risk assessment for a mine closure and reclamation plan', in AB Fourie & M Tibbett (eds), *Mine Closure 2019: Proceedings of the 13th International Conference on Mine Closure*, Australian Centre for Geomechanics, Perth, pp. 355–368, https://doi.org/10.36487/ACG_rep/1915_29_Christoffersen
- Coffield, F & Edward, S 2009, 'Rolling out 'good', 'best' and 'excellent' practice. What next? Perfect practice?', *British Educational Research Journal*, vol. 35, no. 3, pp. 371–390, <https://doi.org/10.1080/01411920802044396>
- CSIRO 2023, *Enabling Mine Closure and Transitions: Opportunities for Australian Industry*, prepared for CRCTIME.
- Department of Mines, Petroleum and Exploration 2025, *Guideline for preparing Mining Development and Closure Proposals*, https://www.wa.gov.au/system/files/2025-12/mdcp_guideline.pdf
- Doomadgee, A & Holcombe, SE 2025, 'What does closure even mean?' at Century Mine: multiple companies, mine closure trajectories and disputation', *Journal of Political Ecology*, vol. 32, no. 1, <https://doi.org/10.2458/jpe.6200>
- Finn, GM & Brown, MEL 2024, 'When 'best' practice isn't...', *Medical Science Educator*, vol. 34, no. 4, pp. 915–917, <https://doi.org/10.1007/s40670-024-02048-2>
- Fitch, K, Clark, T & Edwards, L 2026, *Authentic or Performative? Social Licence to Operate in Settler Colonial Contexts – Rio Tinto, the Puutu Kunti Kurrama and Pinikura peoples and the Destruction of the Juukan Gorge Rock Shelters*, Communication and the Public.
- Foran, T, Barber, M & Ackermann, F 2022, *Understanding the Values of Stakeholders in Australian Post-Mining Economies*, CRC TiME Limited, Perth.
- International Council on Mining and Metals 2025, *Integrated Mine Closure: Good Practice Guide*, <https://www.icmm.com/integrated-mine-closure>
- Kemp, W, Bellairs, S, Joyce, J & Henderson, J 2023, 'Consideration of First Nations' cultural values in mine site rehabilitation by environmental professionals', *Environmental Challenges*, vol. 13, no. 100757, <https://doi.org/10.1016/j.envc.2023.100757>
- Manero, A, Standish, R, & Young, R 2021, 'Mine completion criteria defined by best-practice: A global meta-analysis and Western Australian case studies', *Journal of Environmental Management*, vol. 282, no. 111912, <https://doi.org/10.1016/j.jenvman.2020.111912>
- Marsh, JK 2013, 'Indigenous peoples and mining companies', *Asia Pacific Viewpoint*, vol. 54, pp. 171–184, <https://doi.org/10.1111/apv.12017>
- McCullough, CD, & Lund, MA 2006, 'Opportunities for sustainable mining pit lakes in Australia', *Mine Water and the Environment*, vol. 25, pp. 220–226, <https://doi.org/10.1007/s10230-006-0136-0>
- Measham, T, Walker, J, Haslam McKenzie, F, Kirby, J, Williams, C, D'Urso, J, ... Boggs, G 2024, 'Beyond closure: A literature review and research agenda for post-mining transitions', *Resources Policy*, vol. 90, <https://doi.org/10.1016/j.resourpol.2024.104859>
- Merriam-Webster 2026, *Best Practice*, viewed 30 April 2026, <https://www.merriam-webster.com/dictionary/best%20practice>
- Miller-Sabbioni, C, Goerke, V, Downing, M & Van Leeuwen, S 2023, *The Foundations for Effective Indigenous Inclusion*, CRC TiME, Perth.
- O'Faircheallaigh, C & Corbett T 2005, 'Indigenous participation in environmental management of mining projects: the role of negotiated agreements', *Environmental Politics*, vol. 14, no. 5, pp. 629–647, <https://doi.org/10.1080/09644010500257912>
- Peters, M & Heron, T 1993, 'When the best is not good enough: an examination of best practice', *Journal of Special Education*, vol. 26, pp. 371–385, <https://doi.org/10.1177/002246699302600403>
- Pinnacle 2023, *Digging into Mine Rehabilitation: Underestimated Costs & Risks*, <https://pinnacleinvestment.com/digging-into-mine-rehabilitation-underestimated-costs-risks/>
- Reeves, D, Dowell, K & Welch, J 2025a, 'Argyle diamond mine: a First Nations perspective on closure', in S Knutsson, AB Fourie & M Tibbett (eds), *Mine Closure 2025: Proceedings of the 18th International Conference on Mine Closure*, Australian Centre for Geomechanics, Perth, https://doi.org/10.36487/ACG_repo/2515_33
- Reeves, J, Foran, T, Haque, K, Leea, E, Bush, K & Laing, D 2025b, *An Emerging Vision for Postmine Land Use: A Synthesis of Three Community Deliberations in the Latrobe Valley*, CRC TiME, Perth.
- Sagar, N, Bekele, E, Knight, A, Davis, GB & Linge, KL 2025, *Towards Effective Pit Lake Management: A Survey of Pit Lake Classification and Pit Lake Types of National Importance*, CRC TiME, Perth.
- Smith, LT 2012, *Decolonizing Methodologies: Research and Indigenous Peoples*, 2nd edn, Zed Books, London.
- Tardin-Coelho, R, Murphy, D, Rifkin, W & Maharjan, M 2026, *Indigenous Involvement in Regional Cumulative Effects Assessment and Management*, CRC TiME, Perth.
- Unger, CJ, Everingham, J & Bond, CJ 2025, 'Getting it right: regulating mine rehabilitation and closure in Australia for the green energy transition and critical minerals boom', *Environmental Innovation and Societal Transitions*, vol. 56, no. 101004, <https://doi.org/10.1016/j.eist.2025.101004>
- United Nations 2007, *United Nations Declaration on the Rights of Indigenous Peoples*, Geneva.
- Vandenberg, J, Schultze, M & McCullough, CD 2022, 'The future direction of pit lakes: part 2, corporate and regulatory closure needs to improve management', *Mine Water and the Environment*, vol. 41, pp. 544–556, <https://doi.org/10.1007/s10230-022-00868-5>