

enviroMETS Lighthouse Projects: a strategic pathway to high-value sustainable post-mining land use

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Abstract

This paper presents an overview of the enviroMETS (Qld) Lighthouse Projects (LHP) initiative, which aims to find innovative and sustainable ways to make mining-impacted land valuable to its current and future custodians. The evolving LHP strategy outlines the overall approach and objectives in delivering societal, economic, and environmental stakeholder outcomes by shining a light on what can be achieved. The project principles, derived from collaborative and inclusive planning, emphasise the importance of leveraging the innovation ecosystem, leading the mining equipment, technology and services (METS) sector and quantifying non-financial value.

The key challenges and research priorities of the LHP initiative were identified through a perception survey and online member poll which made clear that technological developments could only be pursued with a clarified regulatory authorisation pathway, and the availability of a multi-factor business case for viable public/private investment. A later survey confirmed the LHP strategy to develop multiple pilot sites was on track and sound.

The paper discusses the outcomes that can be achieved through collaboration, including generating ongoing funds for site rehabilitation, identifying viable business cases and creating sustainable economic development. Additionally, the paper explores the potential for nature-positive outcomes, local employment generation and reduced regulatory hurdles associated with rehabilitation opportunities.

The LHP initiative consists of three investigative research projects: regulatory pathway mapping, post-mining land use business case methodology and the development of investible pilot sites. These projects navigate the regulatory framework impacting economic transformation, develop a reliable methodology for assessing the net best value of post-mining land use options and establish pilot sites to prove new innovative economic purposes. The paper highlights the progress made in each of these projects and the importance of collaboration with stakeholders, including government agencies, mining operators and regional communities.

The paper concludes by discussing the strategic steps necessary for the establishment of multiple pilot sites across Queensland and the attraction of investors for remaining and repurposed mining land.

Keywords: *post-mining land use; regulatory pathways; sustainable communities; regional development; business case; pilot sites; technological innovation.*

1 Introduction

enviroMETS was established with the support of the Queensland Government and METS Ignited as an independent, industry-led, not-for-profit company (limited by guarantee) with a mission to ‘find innovative and sustainable ways to make mining-impacted land valuable to its current, and future custodians’. The company arose out of what was initially a Queensland tailings- and mine-affected water industry cluster: a geographic concentration of interconnected businesses, suppliers and associated institutions (Porter 1998)

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initiated under METS Ignited's cluster program. Some extensive work in 2022 revealed that this approach was too limited and technical for what is a multi-criterion industry issue that fundamentally undermines its social licence. This is particularly relevant in Queensland where mining, particularly of coal, faces increasing social, environmental and cultural resistance.

In addition, Queensland has a significant inventory of 1,200 abandoned mines in various environmental condition, with many identified as being a high priority for rehabilitation. It also has well over 100 operational mines (the majority being coal), with many due to close by 2040. With mining representing 18.5% of the state's nominal gross value added (AUD 90 billion) (Queensland Treasury 2024) and directly employing 76,000 people, it is critical that the rapidly expanding challenge of post-mining land use (PMLU) be addressed in a new approach with fresh eyes.

This paper describes enviroMETS' strategic process to firstly better understand the challenges that need to be addressed to fulfil its mission and then identify, prioritise and work through the steps necessary to develop and demonstrate higher-value productive PMLU solutions. enviroMETS differentiates itself by maintaining a singular focus on demonstrating practical, robust pathways to PMLU alternatives and attracting non-mining industry players to invest in value creation.

There has been an accelerating awareness that the current default approach to PMLU is suboptimal and fails to identify and create best value solutions to recognise value beyond the back-to-past-use environmental-centric solutions. The Eden Project published its definitive book *101 Things to Do with a Hole in the Ground* in 2009 (Pearman 2009), recently refreshed and updated as *102 Things...* (Whitbread-Aburatat & Lowe 2024). A study and extension of the 2009 book by Finucane & Tarnow (2019) referenced those 101 PMLUs, making the observation that:

'Progressively, more companies are identifying opportunities to repurpose mine infrastructure and are taking action in this regard. In addition, there is increased government and community recognition of environmental, social and economic benefits associated with these opportunities. However, the way in which mine infrastructure can be re-used or repurposed varies from site to site and requires consideration of a wide range of factors including the location and type of infrastructure, landscape ecology and landscape architecture, the regional and local planning context, regulatory frameworks, environmental considerations, stakeholder requirements and economics.'

enviroMETS has concluded that a long-term vision, early engagement of PMLU investors and a business case (and, in some instances, also a marketing plan) are critical to allow appropriately timed and cost-effective custodial transfer of infrastructure assets.

enviroMETS created its Lighthouse Projects (LHP) to describe its overall strategy to 'shine a guiding light' on what is globally recognised as a 'wicked problem' (i.e. a problem with complex, interdependent factors) for the mining sector and its associated stakeholders. A key realisation is that the transition from mining to post-mining requires ownership transfer to non-mining entities. Mining companies may be very good at mining but they are not biodiversity stewards, primary producers, community regional development specialists or project developers. The alternate PMLU solutions for a sustainable future arise from 'investment' in a new future for the tenements.

Through a series of stakeholder perception surveys, workshops and seminars, enviroMETS has concluded that the issue at hand cannot be resolved by any single stakeholder working in isolation. Sole-stakeholder strategies are embedded and already well-funded across numerous silos of research institute, government agency and corporate alliances. enviroMETS took the view that a collaborative approach to incorporate innovative and sustainable PMLU solutions with safe and stable outcomes should be prioritised and incentivised as the default. This is characterised in Figure 1, using media player buttons to illustrate approaches to post-mining land, from abandonment to implementing higher-value outcomes.



Figure 1 Moving to the right from 'stop', via 'rewind' to 'next' increases sustainable post-mining land use value

1.1 An ecosystem of stakeholder interests

While there are many subject matter experts and specialist firms focusing on aspects of mine closure for specific projects/sites, and numerous professional services member organisations supporting these firms, the need became evident for an independent, industry-wide approach to raise awareness outside the mining industry.

Drawing on its industry cluster foundations, the enviroMETS team has built an ecosystem of over 300 interested parties who are eager to align their self-interests towards a shared collaborative goal. This ecosystem landscape (Figure 2) brings together six broad stakeholder types, with enviroMETS coordinating the collaboration to achieve the defined outcomes.

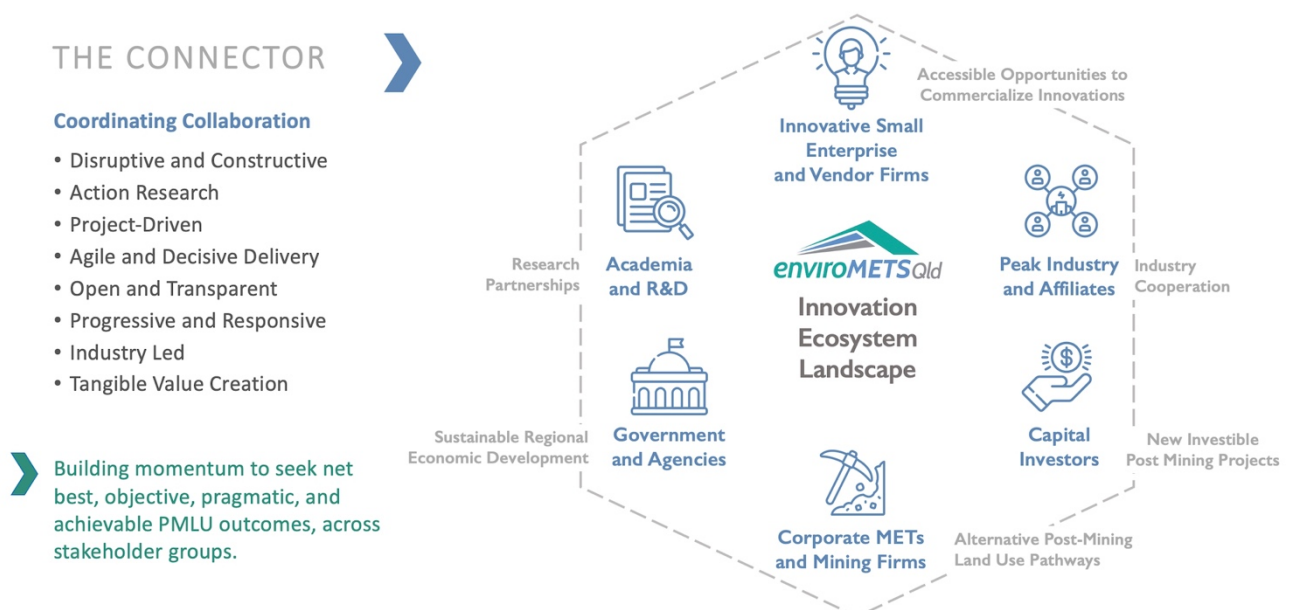


Figure 2 Solving complex 'wicked problems' requires a collaboration of aligned self-interested stakeholders

1.2 Strategic concept

The enviroMETS strategy has been developed and refined to take an investigative approach that is participative and collaborative across our ecosystem of members.

The underlying concept has evolved towards reprioritising the pathways for miners to exit sites while leaving the best societal value for future custodians. This focuses on a future aligned with the evolving expectations and aspirations of regions directly and indirectly impacted by mine closures, and not only on returning the site to its pre-mining landscape condition (Clay 2024). Figure 3 illustrates the underlying strategic concept being pursued through the collaborative ecosystem.

Engaging the broader Queensland community on the PMLU transformation journey is essential. enviroMETS has developed an associated key messages strategy to support this and is pursuing conversations with groups of stakeholders that are not generally at the front line of PMLU discussions, as noted in the book *102 Things to Do with a Hole in the Ground* (Whitbread-Aburatat & Lowe 2024), such as regional development agencies, indigenous corporations, renewable energy developers, property investors, tourism organisations, etc. These stakeholders are likely to hold the keys to high-value alternate PMLU solutions.

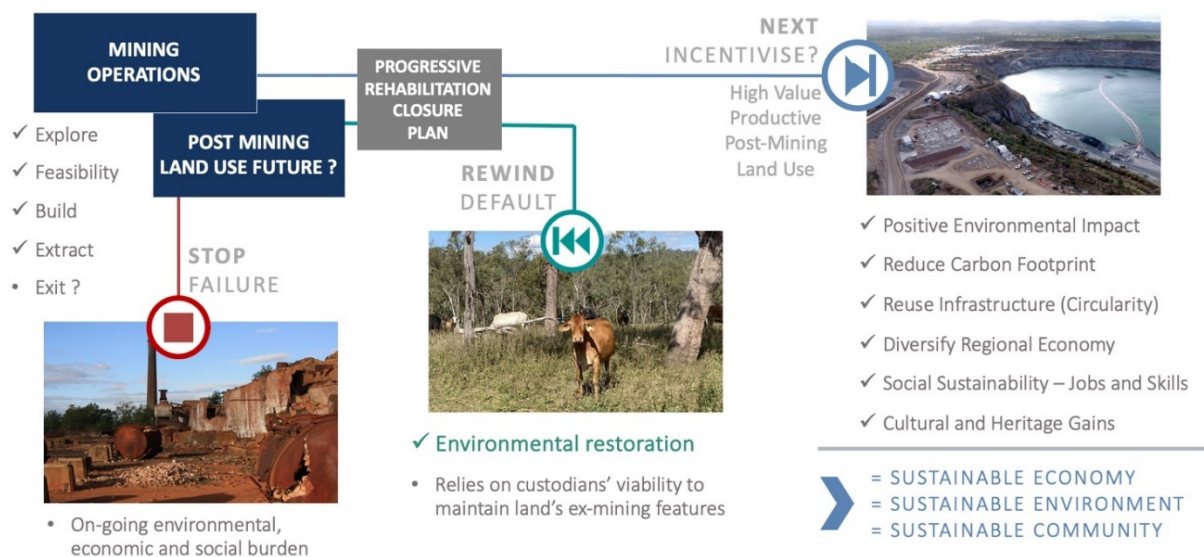


Figure 3 Changing the strategic priority towards higher-value productive post-mining land use solutions

2 Challenges and priorities

2.1 Lighthouse Projects planning workshop outcomes

Before the inaugural LHP planning survey and workshop conducted in early 2023, the prevailing industry sentiment suggested that the near-term prospects for recommercialisation, repurposing and rehabilitating decommissioned mining sites were primarily constrained by several factors. These limitations were perceived to be, in order of significance: insufficient technical knowledge, a scarcity of viable PMLU alternatives, commercial constraint and certain regulatory obstacles. These perceptions have likely prevented investments and possibly led to poor policies.

The LHP planning workshop provided clear insight into the top 12 challenges from stakeholder group (50 participants) ranking (Figure 4a). Three challenges groups were evident:

- 1st to 6th — associated with the regulatory framework which opens the door for policy guidance to change outcomes
- 7th to 10th — challenges that the industry can address over time using improved PMLU project delivery methodology and aiming for higher societal value outcomes

- 11th & 12th — technical and low ranking, indicating that we know enough to start applying it to pilot opportunities.

The workshop discussions ranked the 10 most important outcomes expected of enviroMETS (Figure 4b), leading to four opportunity groupings. The first priority of ‘Create a clear (regulatory) pathway’ was followed by Investibility (B) and Engagement (C). Technological (D) evolved to be the establishment of multiple pilot sites to test, prove and demonstrate innovative PMLU solutions.

enviroMETS’ LHP strategy has subsequently pursued three sequential yet integrated investigative LHP:

- LHP 1 — identify a clear regulatory pathway for innovative repurposing
- LHP 2 — develop investible multi-criteria business case methodology for higher-value PMLU
- LHP 3 — establish PMLU research and development (R&D) pilot sites to test, develop, scale and commercialise new ideas.

PMLU PROBLEM FLIPPED

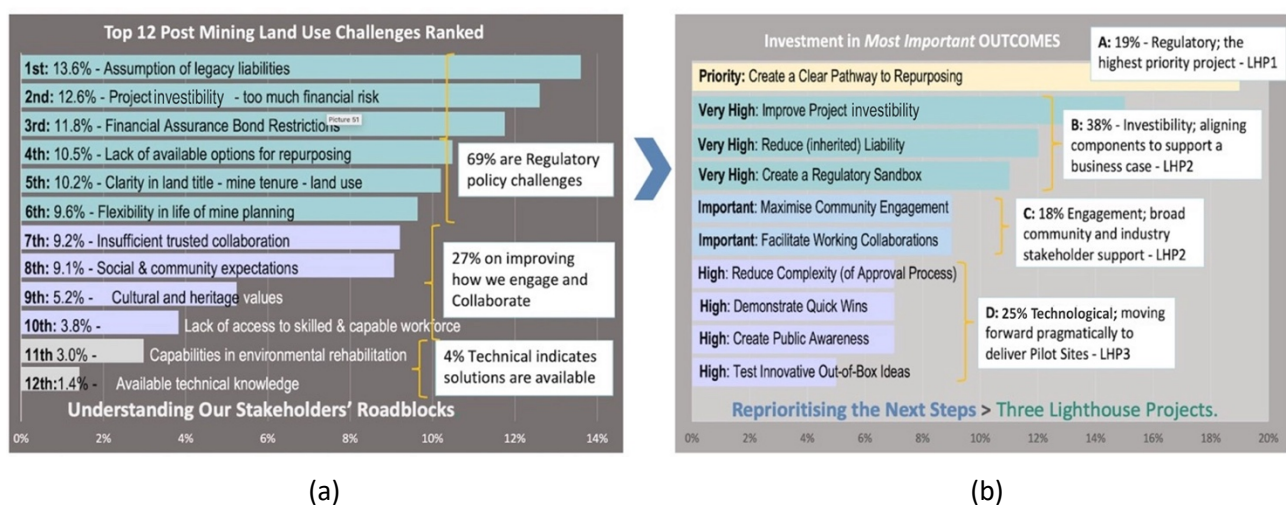


Figure 4 Ranking of land use challenges and their prioritisation for investment from surveys: (a) before, and (b) after, the initial Lighthouse Projects planning workshop

2.2 Diagnostics and scoping

enviroMETS brought together subject matter experts; researchers; government agencies; resource companies; mining equipment, technology and services (METS) firms; and industry bodies to outline the scope and battery limits for the LHPs.

The objectives achieved in this stage were to:

- secure suitable funding sources to underwrite the major investigative projects — LHP 1, LHP 2 and LHP 3
- establish a project reference group comprising senior officials from the state government departments of State Development and Infrastructure; Environment and Science and Innovation; and Resources to serve as a suitable authorising environment to guide enviroMETS during project delivery
- establish access to a senior government official to perform the role of case manager to facilitate whole-of-government coordination and problem resolution, working under the direction of the project reference group

- establish a project consultation group to inform reference group decisions, comprised of representatives from the METS sector, local communities, investors, Traditional Owners and research organisations.

2.3 Coordinating collaboration — an aligned and shared view

enviroMETS' internal activities undertaken to support the current and planned projects include:

- identification of land use options (leveraging *102 Things to do with a Hole in the Ground* thinking)
- understanding stakeholder challenges, their strategic interest and their capacity to invest in the solution
- developing project prospectus and securing funding from government and industry
- engaging participants from the enviroMETS member base to contribute to projects
- building valued relationships with regional communities, the mining industry and other stakeholders
- building momentum to align stakeholders' views in seeking objective, pragmatic and achievable outcomes
- recognising the different perspectives of PMLU value (quantitative and qualitative measures) and identifying a framework to pursue the best architecture for developing collaborative solutions.

The underlying logic is to ensure the necessary components are in place to move the default thinking beyond PMLU as a mining liability to be rehabilitated back to (low-value) pasture or nature; approaching it instead as an opportunity to look towards a collaboration of interests that can utilise the available post-mining infrastructure as an asset for new (higher-value) economic PMLU.

enviroMETS recognises that bringing together diverse, and sometimes entrenched, views is a challenge, however, 'wicked problems' can only be solved through collaborations aligned with the shared purpose of self-interest groups (Figure 5). Deriving an aligned and shared view aims to overcome the human nature position of avoidance, or not recognising another stakeholders' perspective, and (established) opposition to other stakeholder groups.

A study by Foran et al. (2022) of CRC TiME demonstrates how many different community perspectives need to be recognised and accommodated in the development of all PMLU solutions. Regional community populations should have a significant voice in what is proposed for their region. This is somewhat frustrated by the absence of consideration of PMLU in published Regional Plans.

Quantifying value for non-financial or non-economic criteria such as social, community, cultural and environmental benefit also poses challenges that need to be surmounted if we are to obtain the resources to find higher-value productive PMLU solutions. It requires an investor/developer business case mindset and tools to communicate the underlying value and return on investment for both economic and non-economic aspects.

Underlying principles for participation in LHP work are that a group of organisations/firms needs to collaborate to deliver impact to a relatively broad set of stakeholders, and decisions must be made for the collective good of the 'customer' stakeholders rather than the 'supplier' stakeholders.

THINKING DIFFERENTLY


**Engaging, Aligning and
Organising Self Interested
Groups**

- Recognise Shared Challenge
- High Value Contribution
- Multiple Parts of Solution
- All Benefits from Resolution
- Requires Organisation Structure

Facilitated collaboration is the only successful method of solving 'wicked problems'.

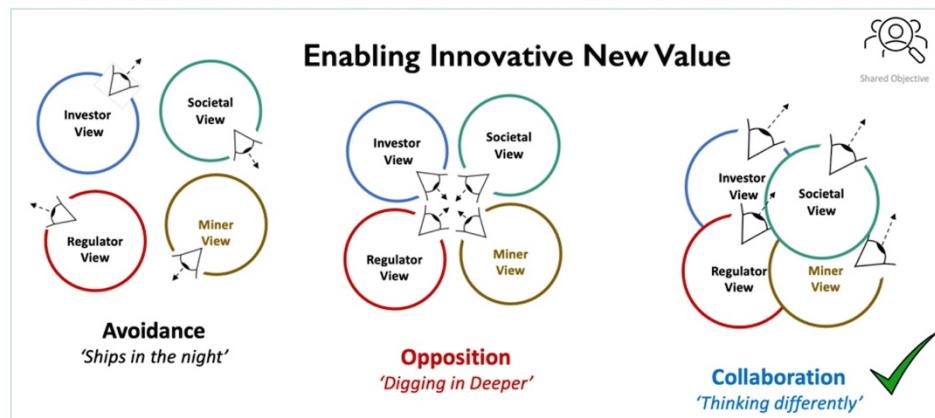


Figure 5 Establishing collaborative thinking is essential to solve 'wicked problems'

2.4 Communication strategies

Given that the diversity of stakeholders is a key foundation of the collaborative ecosystem approach, a stakeholder communications program has been utilised, with recognised global advisors and aligned organisations sharing experiences. The objectives of the communications strategies are to:

- reframe the conversation about PMLU from the traditional focus on the liability of mining activities requiring it to be returned to its past state to prioritising solutions that convert the as-mined asset into the best possible high-value productive PMLU opportunities
- clarify and expand the understanding of PMLU challenges to reinforce the benefits of alternate land use through exposure to global best practice examples shared by Dr Peter Whitbread-Abrutat and his co-authored book, *102 Things to Do with a Hole in the Ground* (Whitbread-Abrutat & Lowe 2024)
- provide awareness-raising events (including targeted stakeholder engagement and briefings) to instil confidence in policymakers and industry investors that alternative PMLUs can create better regional social and economic transitions than current (returning land to past use) practices
- undertake regional or site-based ideation workshops at forums such as the Queensland Mining Expo that stimulate participants to envisage a better future for mining-impacted land and communities
- use findings of targeted stakeholder engagement workshops and briefings to inform enviroMETS Lighthouse Project Two — Business Case Development.

2.5 Pursue high-value opportunities

Promoting high-value PMLU opportunities (Figure 6) is the priority PMLU regional development goal. Any re-mining of mine wastes for legacy or critical minerals (Figure 6, purple line) becomes a finite term bonus that generates value, some of which should be deployed for further environmental remediation.

THREE DELIBERATE STRATEGIES

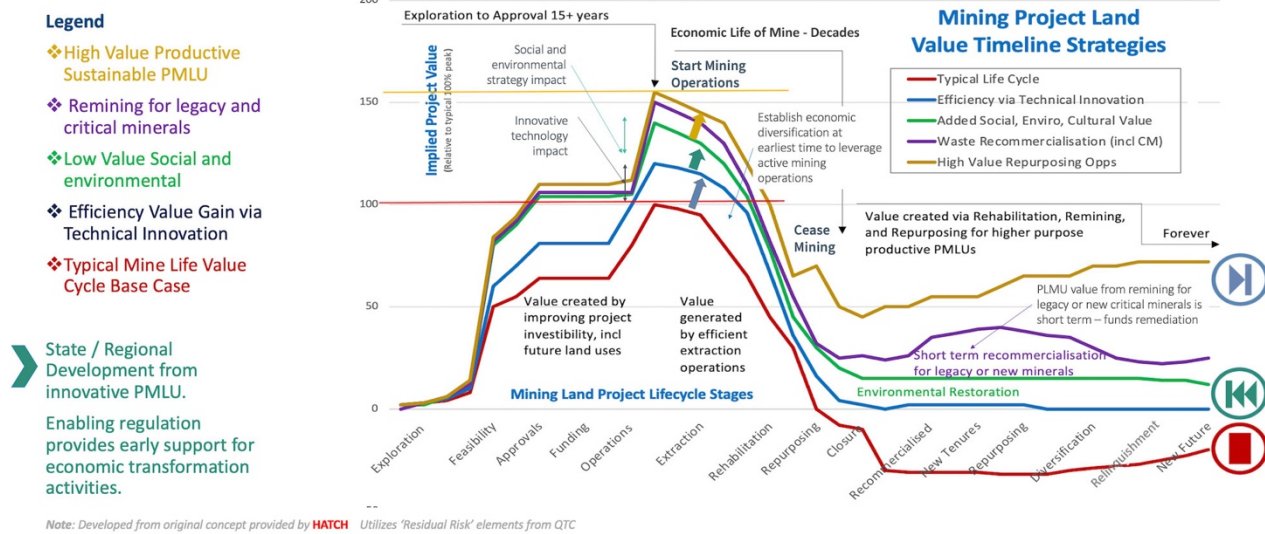


Figure 6 Increasing mining project value via three deliberate strategies beyond the base case (red line). Source: original studies by Hatch (pers. comm., 2022), project data 2010–2016

A challenge taken up by enviroMETS is to guide the development of a framework and apply it to sandbox pilot sites to demonstrate the concepts of added value. A part of this process is to influence all stakeholders to appreciate the value of multi-faceted PMLUs that add ecological diversity, enhance cultural heritage, sustain the community and provide sustainable livelihoods from mining-disturbed land.

3 LHP 1: regulatory pathway mapping

From our stakeholders we are aware that navigating the current Queensland regulatory landscape reduces the likelihood of viable economic transformation of mining-affected land, and there is confusion about the regulatory instruments that could enable, or constrain, alternate land uses.

We recognise that mining has been regulated since the 1860s under evolving versions of the Queensland Mining Act and that until it gained an environmental component, abandoned mine land created a condition that enviroMETS calls the 'scars of the past' (Figure 7) on the environment and the industry's reputation. The Queensland *Environmental Protection Act (1994)* now leads mine closure to rehabilitation to prior use; 'past vegetation replacement'. Neither Act envisages nor facilitates the higher-value PMLU pathway of 'economic transformation'.

This led the scoping of LHP 1, which set out to:

- identify and map the regulatory pathways and challenges for repurposing scenarios
- specifically identify the hurdles for establishing pilot/trial sites
- provide recommendations on solutions to the regulatory challenges experienced
- provide industry support for reshaping of a future enabling regulatory environment.

Professor Brett Heyward led the project, supported by contracted researchers from CRC TiME, international reviewer (Dr Peter Whitbread-Abrutat) and the enviroMETS Project Reference Group.

An enabling regulatory environment is critical to the pursuit of superior outcomes for the next life of mined land, as indicated in Figure 7.

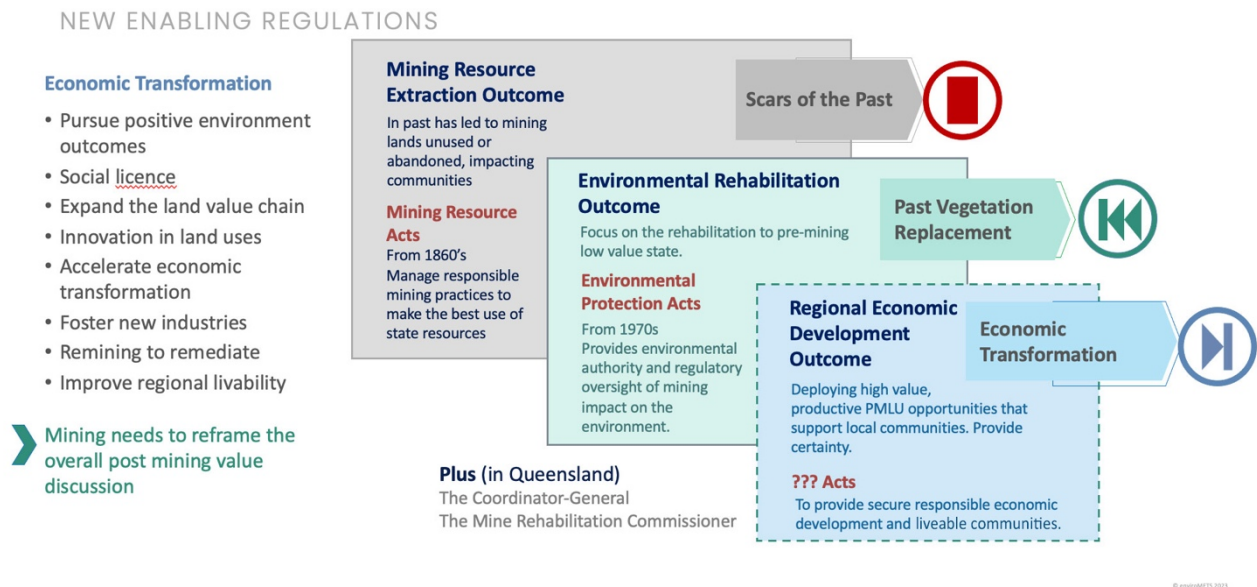


Figure 7 Regulatory environment landscape related to an economic transformation exit pathway

The Lighthouse Project 1 Report (Heyward 2023) provided justification for the following nine recommendations:

1. the need for a series of strategic planning frameworks to guide potential PMLU-based activities in designated geographical zones (e.g. the Bowen Basin, North West Minerals Province, North West Cape, etc.)
2. strategic planning frameworks to identify potential multi-site and site-specific PMLU options to provide direction to current mine operators when developing mine rehabilitation plans
3. the creation of a new mining remediation tenure to facilitate PMLU activities such as secondary mining
4. the establishment of a new tenure arrangement and new environmental authorities that partition the liabilities of new PMLU operators from residual risks due to former mining activity at the site
5. modernisation of the Environmental Protection Act to enable it to deal with PMLU outcomes more effectively
6. examination of targeted government incentive schemes to encourage innovative PMLU outcomes that take advantage of strategic assets created by mining activities
7. creation of a 'concierge service' within the state government to help proponents of innovative PMLU options navigate the current regulatory and incentive systems, as well as help identify potential PMLU sites
8. intergovernmental negotiations with the Australian government to design suitable tax incentive schemes to encourage capital expenditure on innovative PMLU options
9. inclusion of suitable mine waste (i.e. rock and tailings) as recycled material in the Department of Transport and Main Roads procurement processes.

It is worth noting recommendation 5, which observes that (Queensland's) *Environmental Protection Act 1994* (Queensland Government 1994) needs modernising. While a valid point, enviroMETS is pursuing shorter-term endeavours to apply current regulations to enable PMLU R&D pilot sites to be established in some form of sandbox. In so doing, we may test and probe areas that modernisation may affect in the future.

3.1 Further studies

LHP 1 recommendations invited further studies to be undertaken to provide stakeholder briefing material. In reference to recommendation 1, Ippolito (2024) examined all 13 Regional Plans looking for references to PMLU planning. It observed that almost all the current Regional Plans are silent on PMLU, and certainly with respect to dealing with the end of the extractive mining phase. It is significant that this reflects a regional planning short-term mindset, and that mining activity cessation is unexpected rather than being planned for in a regional context. This is a social inhibitor of regulatory change, and regional transitions should be addressed as a priority if innovative PMLU solutions are to be approved.

Work is being undertaken to develop a better understanding of potential significant economic, environmental and social opportunities that new approaches to PMLUs can unlock with different thinking intent on finding higher-value productive uses for as-mined landforms. Enabling enterprises to unlock value from mine wastes requires a re-think of both the ability to undertake secondary commercial activities on a mining lease and access without legacy liability for METS companies to operate on active mining sites.

3.2 Mixed signals

enviroMETS sees a growing appetite for regulatory change that can encourage and enable innovative PMLU solutions. Many recent papers and guides default to the mindset and regulatory requirements that return mining land to past use while also questioning alternative approaches. For example:

- The Queensland Government technical paper on mining voids (Côte et al. 2024) suggests assessment whether it is feasible to backfill the void or not, and whether it will hold a permanent water body. It suggests decision-making methods such as a multi-criteria analysis that can be used to compare options and identify suitable PMLUs for mine voids.
- Australia's Department of Industry, Innovation and Science (2016) offered an insight in its Mine Rehabilitation handbook into how the industry defaults to environmental rehabilitation.
- Mudd (2018) argued the environmental case for a complete pit backfill of the McArthur River void.
- Banfield et al. (2023) raise the economic and social value of exploring alternative PMLU solutions.
- The Department of Regional NSW (2023) presents a vision for PMLU where the next land use can be attracting new investment, creating jobs and ensuring a high quality of life for communities. Areas disturbed by mining provide significant opportunities for economic development and diversification. This document provides general guidance to assist and encourage mining lease holders to explore opportunities for alternative and innovative PMLUs for mine sites. It does not offer definitive regulatory advice for mining lease holders as it still retains a default focus on returning mine sites to past use.

4 LHP 2: multi-criteria post-mining land use business case methodology

The mixed signals and inconsistency have led to the second identified step in the enviroMETS road map: to develop a reliable, repeatable methodology of assessing the 'net best value' of post-mining land use options. The PMLU business case must include the following key elements:

- distilled viable options from site and regional characterisation
- identification of the net value of minerals, and new commercial, social, environmental and cultural aspects
- a standardised format to improve the efficiency of government 'authorisation processes'
- a tested 'practitioner toolkit' with five pre-feasibility pilot site business cases.

As illustrated in Figure 8, the multi-criteria PMLU business case methodology being developed will consider all components of value gain from implementing innovative solutions.

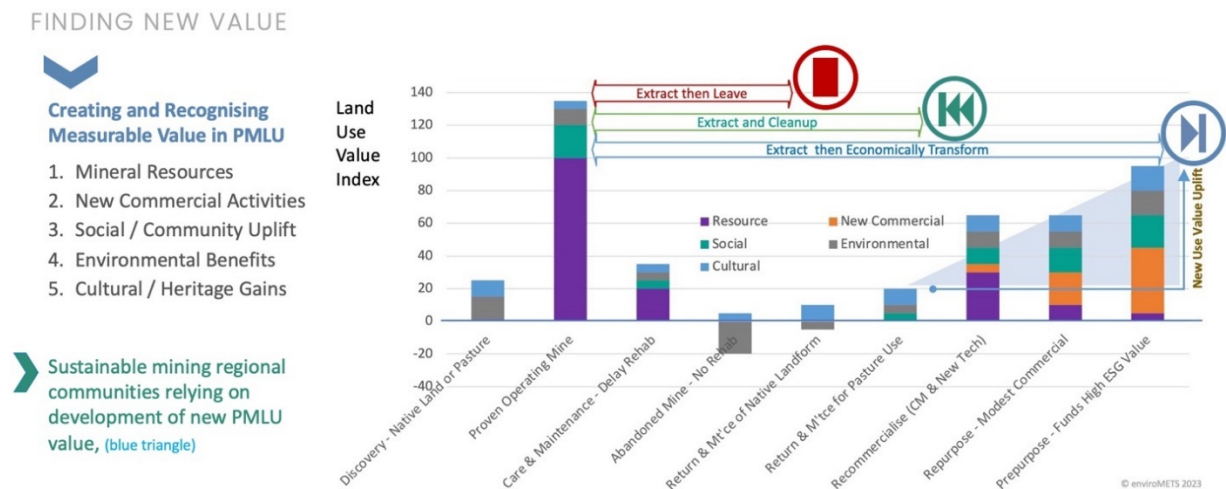


Figure 8 New value extracted from post-mining land from re-mining, repurposing and supporting environmental rehabilitation

4.1 Five core value areas

There are five core areas of value to be quantified in the PMLU business case: further mineral extraction, new commercial land uses, uplift in social value for the town and region, the improved environment and the preservation of cultural/heritage interests (Figure 9). These areas of value will be applied to demonstrate a reliable, repeatable and comparable multi-criteria assessment methodology with a practitioner toolkit. The resulting methodology intends to align with the baseline works project for mine rehabilitation and closure collaboration commissioned by the Queensland Resources Council and the International Council on Mining and Metals initiatives (Worden et al. 2021). The LHP 2 project promotes a novel and holistic approach to post-closure planning. The work reinforces that a thorough understanding of community priorities, government development goals, technical feasibility and collaboration opportunities is necessary to draw together crucial ingredients for longer-term and more sustainable outcomes for Queensland's mining regions.

The proposed LHP 2 model — develop multi-criteria business case methodology — is intent upon developing evaluation modules for each core value component, with each module likely to have a subsequent layer of subcomponent modules. The five modules to be developed by subject matter experts will draw on reliable methodologies to estimate measurable value. They are:

1. mineral value from re-mining and reprocessing of mine wastes for legacy minerals and/or new critical minerals using new technologies
2. economic repurposing value from new enterprises utilising the as-mined landform
3. social revitalisation value of the negatively impacted land being economically transformed
4. environmental restoration value from activities that deliver a beneficial outcome
5. cultural and heritage value through rejuvenation and higher-quality participation.

These five modules will insert quantified values into a coordination module (Bryan Maybee, pers. comm., 23 October 2023) in a prescribed format. This will provide the structure for each module to implement continuous improvement while retaining a comparable quantified core output. The collective value is to be assembled in module six:

- net best value for PMLU options will be drawn together through a systems controller module.

Subsequent investment feasibility in higher-value productive PMLU solutions should be guided by the quantified net best multi-criteria business value assessed.

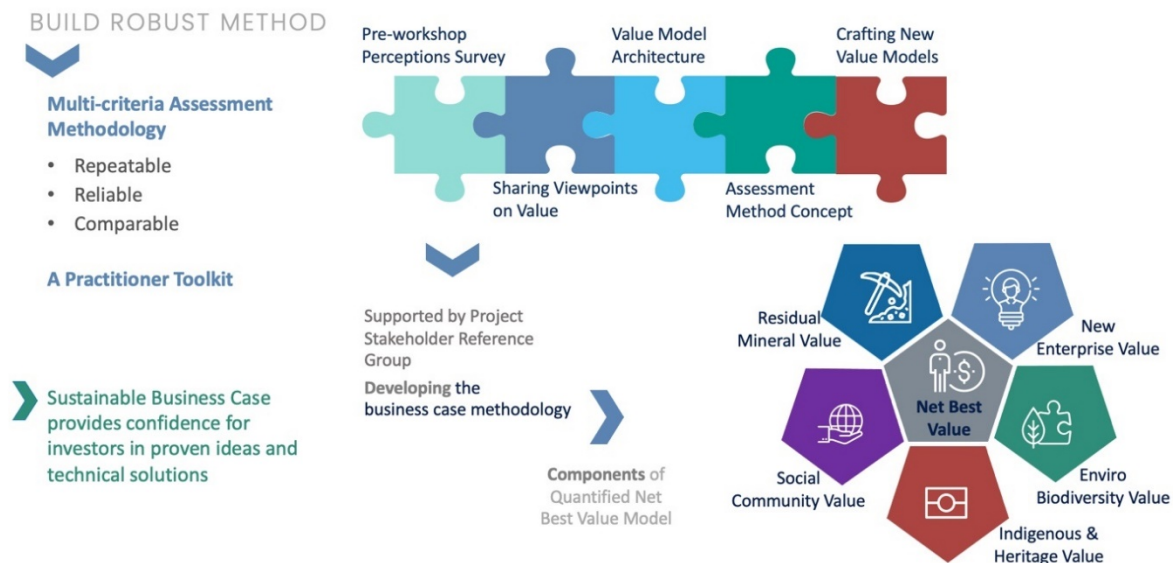


Figure 9 The method and multi-criteria components envisioned to quantify best value

4.2 Interdisciplinary and multi-stakeholder approach

There is extensive research available in technologies, economics and social approaches to identifying suitable PMLUs in both site-specific and regional contexts. The issue is not a lack of knowledge. For example, Worden et al. (2024) and others provide valuable, in-depth research on considerations and methodologies to draw upon. The challenge is to find a practical, efficient pathway to enable and finance physical pilot sites for testing and proving PMLU solutions. Assembling and coordinating an interdisciplinary and multi-stakeholder approach to develop an efficient business case method is key. The resulting methodology, while not perfect, will be workable and capable of supporting public-private investment decisions.

It is important to develop a depth of understanding beyond what has, or has not, served us in the past (Measham et al. 2024). enviroMETS is committed to identifying efficient pathways to avoid ambiguity and uncertainty specifically in the Queensland jurisdiction context. The establishment of development pilot sites proposed in our LHP strategy can accelerate the identification, proving and scaling of new PMLU solutions.

5 LHP 3: develop investible pilot sites

The LHP 3 deliverables are to identify, scope and facilitate several pilot sites in Queensland where stakeholders can test and demonstrate new innovative economic purposes. Due to the work done to date, this phase has the interest of several regional councils, mining operators and government agencies. However, it cannot advance too far until the work from LHP 1 and LHP 2 is well advanced.

This project will utilise the expertise within the stakeholder ecosystem to:

- develop a full business case for each site redevelopment and economic transformation, using the LHP 2 methodology
- socialise the project with METS companies, researchers, entrepreneurs and locals — anyone with an idea to test and commercialise
- establish an operating entity, identify investors and set out governance principles for each regional pilot site that is developed.

This project will draw upon international best practice solutions through its relationship with global partners and associates. For example, the Eden Project, Regeneration Enterprises and similar organisations have expressed interest in engaging with enviroMETS. Whitbread-Abrutat and Lowe's (2024) book, *102 Things to Do with a Hole in the Ground*, demonstrates that the power of showcasing good examples to build confidence among policymakers, investors and the public should not be underestimated. There are multiple innovative and sustainable example uses for 'holes in the ground' that enviroMETS will be investigating and evaluating within the LHP 3 pilot site program (Figure 10). While it is easy to dismiss these examples as not applicable to Australia, we believe they expand our view of what is possible.



Figure 10 Global examples of higher-value productive post-mining land uses

6 Global opportunities

enviroMETS has established its LHP strategy in the form of a series of strategic steps. Apart from benefits for impacted local mining communities from the LHP approach, it also unlocks a significant global commercial opportunity for our METS sector businesses (Figure 11). The recent CSIRO Futures report projected expenditure on mine rehabilitation and closure activities to exceed AUD 4 billion each year through to 2040 (CSIRO 2023). It observed that 'Safe, cost-effective, and sustainable solutions will be needed to address the complex economic, environmental, and social challenges posed by mine closures'. This fourth step aiming at global opportunities aligns with the view of CSIRO (2023) that 'Australia can leverage domestic mine closure challenges to become a global supplier of solutions that improve outcomes and reduce the costs of mine closure and transitions'.

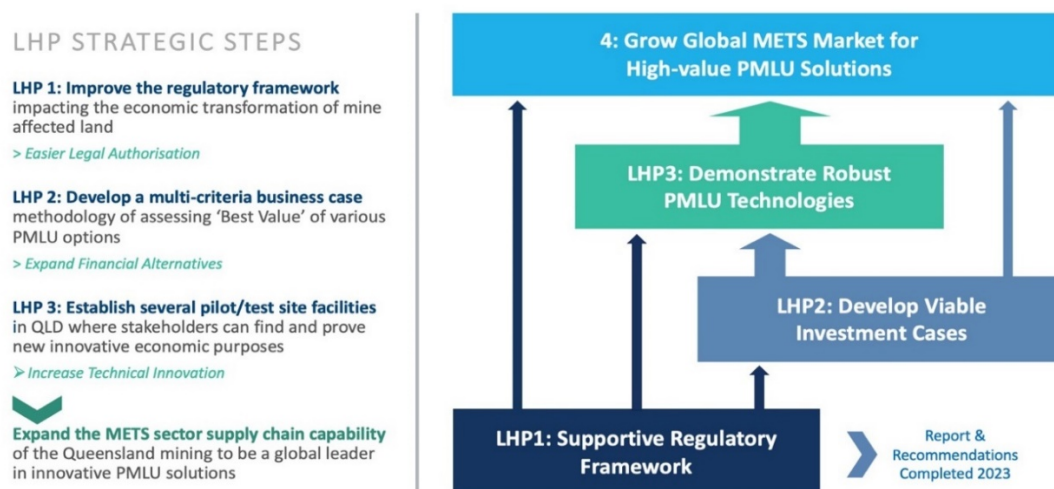


Figure 11 The fourth step of the Lighthouse Projects is to establish leadership in post-mining land use solutions

7 Conclusion

enviroMETS is providing a key independent industry-led role and is working with key stakeholders to develop a framework and methodology for industry to capture opportunities associated with post-mining land use.

The pathway to the establishment of pilot sites where stakeholders can find and prove new economic purposes for post-mined land will provide our METS sector with a global strategic advantage. We look to accelerate global growth opportunities using our own growing demand for innovative solutions that support high-value social, environmental and economic outcomes for land transitions.

Acknowledgement

enviroMETS thanks our members, advisors and contributors for their input and advice in preparation of this paper. Also, acknowledgement is due to the Queensland Department of State Development and Infrastructure who encourage us to think and comment freely about the multi-dimensional challenges and opportunities associated with post-mining land use.

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