

THE MINE LAND POST

WINTER 2021

The Mine Land Rehabilitation Authority works with community, industry and government to oversee the rehabilitation planning of declared mine land and ensure transition to sustainable post-mining land uses in Victoria.



From the CEO

Welcome to our Winter 2021 edition of our quarterly newsletter the Mine Land Post. The 30th of June 2021 marks the first anniversary of the Mine Land Rehabilitation Authority (MLRA).

This is a proud moment for the team comprising Professor Rae Mackay, the former Commissioner and now the MLRA Board Chair, along with our technical advisors, transitioned from the office of the Latrobe Valley Mine Rehabilitation Commissioner. A proud moment too for the other five members of the MLRA Board; Christine Trotman, (Deputy Chairperson), Claire Miller, Corinne Unger, Ian Gibson, and Ian Nethercote.

In this Winter edition we are celebrating the MLRA's achievements over the past year: providing information to stakeholders and communities by using online media, an active website, regular media updates, and two webinars reporting the state of play in the LVRRS Implementation Actions.

You can read about our 2020-2021 highlights that were featured in an advertorial in the Latrobe Valley Express on 24 June 2021, and also available on our website.

We are also featuring innovative approaches to mine rehabilitation such as: enhancing aquatic ecosystems in pit lakes, conserving heritage and generating post-mining economies, digital innovation, and completion criteria for mine closure planning.

I hope you enjoy reading these articles, and the Board and Staff of the MLRA look forward to hearing any comments that you may have.

Yours,

David Salmon
CEO MLRA

IN THIS ISSUE:

- MLRA's 1 Year Anniversary
- Geotourism: post-mining heritage & economies
- Mine voids aquatic ecosystems
- Digital innovation in mine rehabilitation



Our Vision

Forward thinking for the MLRA is strongly influenced by timeframes for mine closure and relinquishment for the three Latrobe Valley declared coal mines. These timeframes are long term (decades) and important in developing our vision.

Existing closure timing for each mine is as follows:

- Hazelwood Mine and Power Station stopped operations in 2017 nearly fourteen years before original closure date.
- Yallourn Power Station planned closure has been brought forward from 2032 to 2028 as announced by Energy Australia this year.
- Loy Yang plan to stop operations in 2048.

More mines may be declared but our vision covers this eventuality.

The MLRA will ensure rehabilitation standards are maintained, building the organisation towards potential mine land custodianship and management to maintain safe, stable, and sustainable post mining land.

The key components of our vision are:

- Oversight and assurance of declared mine land during rehabilitation and closure to reduce residual risks;
- Improved and ongoing stakeholder engagement, including engagement with traditional owners; and
- Education of communities about mine rehabilitation processes.

The MLRA aims to minimise negative impacts and maximise opportunities for the community once the mine licences have been relinquished. It will do so collaboratively with stakeholders and community members, and with respect and integrity.

Yours,
David Salmon
CEO MLRA

We're Celebrating Our 1 Year Anniversary

On 30 June 2021 we celebrated our first year as the Mine Land Rehabilitation Authority (MLRA).

With the appointment of Rae Mackay, the former Latrobe Valley Mine Rehabilitation Commissioner, as Board Chair, and five Board members in July 2020, it was a proud moment when the MLRA became the overseer of the Latrobe Valley's declared brown coal mines: Hazelwood, Yallourn and Loy Yang.



We have moved our office!

We have moved to our new office located at 65 Church Street, Morwell in the new GovHub.

Our 2020 - 2021 Highlights

One year on, and some of our highlights include:

August 2020: reviewing the AGL Loy Yang Rehabilitation and Closure Plan submitted to Earth Resources Regulation as part of the licensee's newest Work Plan submission.

September 2020: first virtual presentation to update the Latrobe Valley Sustainability Group on the latest findings for declared mine rehabilitation. Publishing our first Mine Land Post Spring 2020 quarterly newsletter giving an overview of "who does what in mine rehabilitation" and the next steps for the LVRRS.

November 2020: attending the Guidance on use of climate change scenarios for water resource planning for mine rehabilitation workshop for Implementation Action 1 of the LVRRS.

December 2020: tabling the Latrobe Valley Mine Rehabilitation Commissioner 2019-20 Annual Report in both Houses of Parliament, the third and final report from the Commissioner's Office. Publishing the Mine Land Post Summer 2020, showcasing important ongoing mine rehabilitation research to develop safe, stable, and sustainable landforms benefiting the Latrobe Valley community into the future.

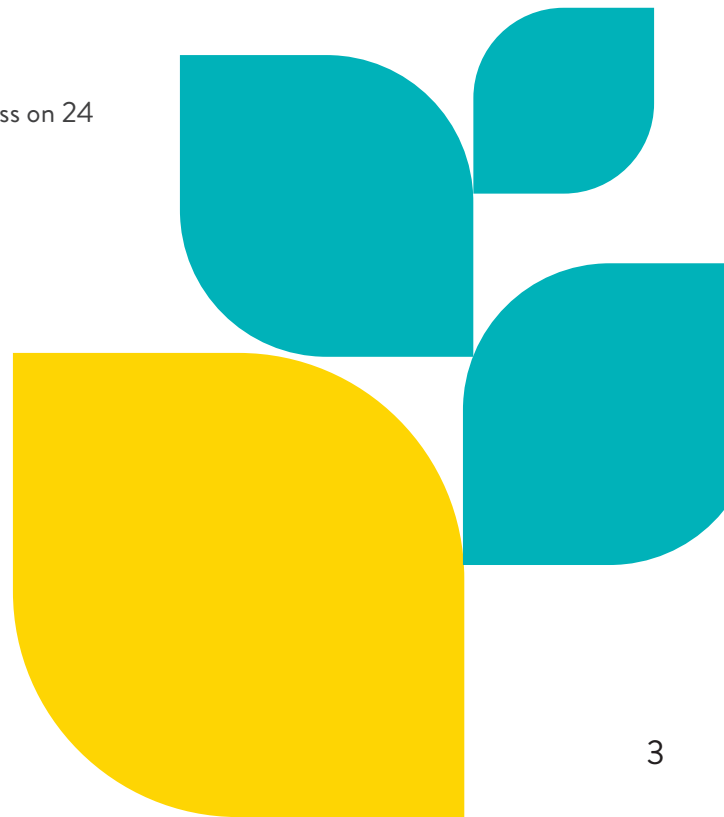
January 2021: welcoming our new CEO David Salmon, who's experience in senior management roles and knowledge of mine pit void water management and coal mine closure are invaluable assets in tackling mine rehabilitation challenges and achieving the MLRA's goals.

February 2021: hosting the LVRRS Implementation Actions 1, 3, 4 and 5 virtual webinars with speakers from DELWP and DJPR. Our Board touring the Yallourn mine, scheduled to close in 2028.

April 2021: our Board completing site visits of the Latrobe Valley's brown coal mines, with a tour of Loy Yang, where mining is currently scheduled to cease in 2048. Publishing the Mine Land Post Autumn 2021 connecting with World Water Day, focusing on mine rehabilitation water quality, and featuring Yallourn North Extension Open Cut, a local mine rehabilitation success story.

May 2021: attending the Australasian Institute of Mining and Metallurgy (AusIMM) Life of Mine Conference, and presenting two papers: Overseeing Latrobe Valley Mine Rehabilitation, and Coal Hole: community engagement using experimental art.

You can read the full advertorial published in the Latrobe Valley Express on 24 June 2021 on our website by clicking [here](#).



Sustainable Mine Outcomes

In May, Rae Mackay, Board Chair, and Rhonda Hastie, Technical Advisor, attended virtually the Australasian Institute of Mining and Metallurgy (AusIMM) Life of Mine Conference.

Papers presented included: Overseeing Latrobe Valley Mine Rehabilitation, and Coal Hole: community engagement using experimental art. Rae Mackay also participated in a panel hosted by the Cooperative Research Centre for Transformations in Mining Economies (CRC TiME).

Presentations at the conference were wide-ranging, but key themes ran across all of these. Transitioning mining-centric communities where mining is ceasing is a nation-wide issue.

Integrated mine planning is crucial to not only achieving rehabilitation outcomes, but transition for the community as well.

Many mining projects, particularly new or expansions, are now 'starting with the end in mind', whereby the final rehabilitation landform is used to define all works at the site. In order to achieve this, several presentations highlighted the importance of early and varied stakeholder engagement to ensure that the end goal will actually meet the community's needs.

The conference also highlighted that residual (post rehabilitation) risk management continues to be an issue for licensees wanting to relinquish their mine licences.



Residual risk management is one of the Authority's key roles for our State's declared mines.

We have been fortunate to have several of the presenters summarise their presentation for this newsletter.

Coal Hole: community engagement using experimental art

The 'Coal Hole' project run by the former Office of the Latrobe Valley Mine Rehabilitation Commissioner, was presented at the conference demonstrating how community-led, grass-roots engagement can lead to great education and learning opportunities.

Undertaken in 2019 and 2020, the program was a collaboration between the Commissioner's Office and Big Picture Space. The program utilised a series of free community art workshops to educate the community on the processes and issues of brown coal mine rehabilitation, and also highlight positive post-coal opportunities that may arise from rehabilitation.

The workshops, hosted by local artists, explored key themes, such as geotechnical instability, water resources, and mining landforms

Using different art media such as metal and wood work sculpture, creating zines, high-vis fashion design and culminated in an on-site photoshoot at one of the region's brown coal mines.

The Commissioner's Office, whose staff are now team members of the MLRA, learned a great deal through the process, including how using a different medium, such as art, can attract and engage community members that would otherwise be missed through more formal engagement channels.



The project also demonstrated how community-led engagement can open up opportunities that would otherwise not be available, as through the project the Commissioner's Office was invited to run workshops at the Latrobe Valley Youth Climate Summit. Some of the art produced can be viewed [here](#).

Author: Rhonda Hastie, Technical Advisor, MLRA.

Overseeing Latrobe Valley Mine rehabilitation

The Mine Land Rehabilitation Authority (the Authority) oversees Victoria's declared mine rehabilitation.

Declared mines are identified as geotechnically and hydrogeologically complex. The Latrobe Valley brown coal mines are presently the only declared mines in Victoria.

In addition to fire risks, the brown coal mines are inherently unstable and require continuous monitoring and management of ground movements and groundwater pressures around and below the pits to prevent damaging ground movements.

Over the last fifteen years several damaging events have occurred. These events highlight the difficulties of maintaining pit stability in the long-term, even with rigorous ground control management plans. Ongoing risks of instability impact the sale of mine land to new owners, the development of new land uses and the long-term management of mine land.

The creation of a well-defined pathway for release of land for future use and long-term management of stability risks is a major reason for the existence of the Authority.

Victoria is not alone in dealing with this issue. Management of mine land following rehabilitation has increasing focus nationally and internationally.



Image: Hazelwood brown coal mine

All Commonwealth states are presently developing approaches to ensure that relinquishment can occur and long-term liabilities are met through appropriate frameworks for oversight, identification of post-closure residual risks and fund management to meet ongoing costs and unforeseen events.

Significant developments are also underway internationally. An excellent example is the current land management framework in Saskatchewan, Canada (Cunningham, 2019) that provides an advanced model for land transfers and long-term management through an Institutional Control Program and land registration.

It is interesting to observe that the Authority's remit for long term management of the Latrobe Valley

mines derives from similar concepts to those developed for Saskatchewan but differs in so far as it recognises private ownership as a key strategic endpoint for most mine land in the Latrobe Valley.

As the eventual overseer and potential owner of mine land with post-closure residual risks requiring monitoring and maintenance, the Authority provides the platform for ensuring relinquishment can occur, costs are covered and community has confidence in long-term access to and management of rehabilitated land.

Author: Rae Mackay, Board Chair, MLRA.

Reference: Cunningham 2019. Post Closure Management of Decommissioned Mine/Mill Properties Located on Crown Land in Saskatchewan (Institutional Control Program). [Click here to read more.](#)

Geotourism - Conserving Heritage and Generating Post-Mining Economies

The Australian Geoscience Council Inc (AGC) launched the National Geotourism Strategy in April 2021 in consultation with one of its key members, the Australasian Institute of Mining and Metallurgy (The AusIMM), through the auspices of its Heritage Committee and the Society of Social and Environment.

The consultation aimed to determine how to best develop geotourism throughout Australia to enhance the regional development of mining areas during current mining activities and after mine closure.

Geotourism adds considerable holistic content value to traditional nature-based tourism as well as cultural attributes (embracing both Aboriginal and post European settlement) having regard to mining aspects and can be delivered through mechanisms such as geotrails and geoparks within defined 'GeoRegions'.

By raising awareness of the importance of the area's geological heritage in society today, geotourism gives local people a sense of pride in their region and strengthens their identification with the area.

In recognition of these benefits, the National Geotourism Strategy embraces seven strategic goals that includes (Goal 5) i.e., 'to develop geotourism in regional mining communities with potential geoheritage and cultural heritage sites.'



Image: Herberton Mining Centre. Courtesy: Angus Robinson

Goal 5 identifies opportunities for geotourism in rural and regional Australian post (or active) mining communities, so their recreational, educational, and cultural values can be realised. The goal aims to draw attention to the range of activities (including museum and geotrail development) that could be conducted in these places.

By way of example, a national mining park has also been proposed for the Hunter Valley to celebrate the significant role mining has played in Australia's development, since the first coal mining in Australia by Aboriginal people (on a small scale) prior to European arrival.

The AusIMM has also identified several topics which could form the basis for incorporating this aspiration into Goal 5.

This includes issues relating to the consequences of mine closure. The current emphasis is on environmental remediation (make safe, stable, and non-polluting).

This needs to be broadened to preserve the mining heritage including gossans and other geologically significant exposures, structures (e.g., buildings, workings, and equipment) and other artifacts (e.g., mining and personnel records).

To read the full presentation you can download it [here](#).

Author: Angus M Robinson FAusIMM (CP), Coordinator, National Geotourism Strategy, Australian Geoscience Council. For further information contact Angus M Robinson at angus@leisuresolutions.com.au.

Aquatic Ecosystems in Mine Void Lakes



Little is known about the aquatic ecology of lakes created by coal mining in eastern Australia, and their capacity to support biodiversity values as a beneficial post closure land use. Glencore Coal commissioned BMT to carry out a pilot study aimed to characterising the aquatic ecosystem of non-acidic pit lakes created by open-cut coal mining. Such information is important to determine potential beneficial uses and liabilities during mine closure planning.

Two permanent deep water (>15 m) mine pit lakes were sampled: Westside Final Void (West Wallsend, NSW) and OCC A3 West at Oaky Creek Mine (QLD). The Westside Final Void finished mining in 2012 and has been rehabilitated, while OCC A3 West has not yet been rehabilitated.

The physio-chemical properties differed between mine pit lakes. OCC A3 West was saline (11 ppt) and remained well mixed throughout the year, whereas Westside Final Void was predominantly freshwater with a brackish (4 ppt) lens, remaining stratified throughout the year. Both mine pit lakes had characteristics of a young ecosystem with limited organic matter inputs - high water clarity, low nutrient concentrations and low phytoplankton biomass. Metal/metalloid concentrations were generally less than aquatic ecosystem protection guideline levels in sediments and waters, indicating a low threat of toxic effects.

Phytoplankton, aquatic macrophyte and aquatic macroinvertebrate assemblages at OCC A3 West had

lower taxa richness and taxonomic diversity than Westside, which is expected to reflect differences in salinity regime and state of rehabilitation.

The aquatic macrophytes and macroinvertebrates recorded in OCC A3 West were all salt tolerant taxa. Both mine pit lakes supported abundant but depauperate freshwater fish assemblages, comprised of the native rainbowfish, glassfish and bony bream at the unrehabilitated OCC A3, and the introduced *Gambusia holbrooki* at Westside. The lakes also provide feeding habitat for two freshwater turtle species (short-necked turtle at OCC A3 and long-necked turtle at Westside) and wetland-associated birds such as black swans, pied cormorant, white faced heron and Pacific black duck.

There are multiple ways in which aquatic habitat values of pit lakes can be enhanced, depending on site characteristics and management goals:

- Reduce lake wall height to create linkages between terrestrial vegetation and aquatic environments (as occurs at Westside).

- Planting of riparian vegetation to enhance aquatic-terrestrial ecosystem linkages (as occurs at Westside). Creation of a broad littoral zone promoting the development of benthic primary producer habitat (i.e. microalgae, emergent, submerged and floating aquatic macrophytes). Planting of aquatic macrophytes to promote habitat diversity, stabilise substrates and uptake nutrients
- Introduce fallen timber and large rocks to create habitat for fish (feeding, shelter), birds (roosting, feeding) and invertebrates (feeding, shelter).
- Undertake fish stocking using species native to the catchment and suited to lake environments. Establishing native fish populations creates several ecosystem services, including control of pest insects (midges and mosquitos) and provides food resources for piscivorous birds and larger fish.

To read the full article click [here](#).

Authors: D Richardson, Senior Principal Scientist, BMT, Brisbane, Darren.Richardson@bmtglobal.com; G. Bourke, Environmental Scientist, BMT, Brisbane, Grace.Bourke@bmtglobal.com; P Swart, QLD Environment and Community Manager, Glencore Coal Assets, Brisbane, Pieter.Swart@glencore.com.au.

Digital innovation in mine site rehabilitation monitoring

Understanding and improving rehabilitation practices, from earthworks to seeding to remedial management, requires scientifically robust monitoring. While ecological monitoring benefits from repeated use of consistent methods to interpret long-term trends, it is not immune to digital disruption. Advances in remote sensing continue to change the way we observe and analyse landscapes.

So, what will best-practice monitoring involve in the future? Should remote sensing be a standardised approach alongside traditional, on-ground ecological monitoring? There is no one-size-fits-all program, the needs of the mine and stakeholders, and the cost, must all be considered. Remote sensing is simply the science of obtaining information on an area of the earth without physically being there, typically using data from satellites, aircraft or UAV's.

Monitoring with remote sensing can:

- Dramatically improve spatial scale.
- Improve accuracy and reproducibility of data.
- Minimise health and safety risks related to remote field work
- Reduce costs by reducing the field survey effort.
- Complement traditional field methods.

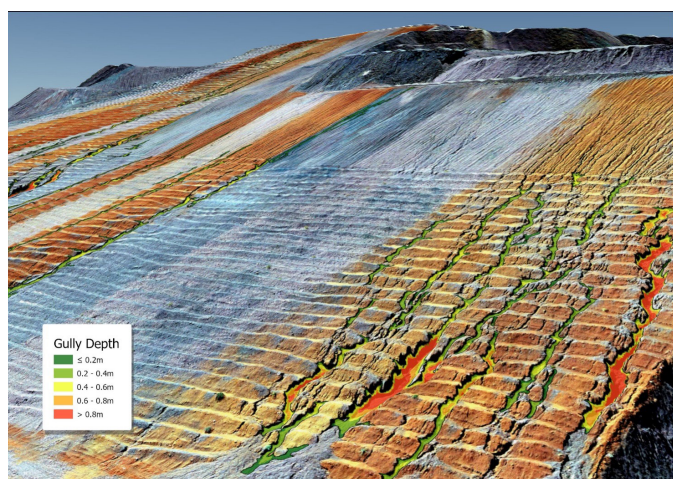


Fig. 1: Erosion gully assessment of a waste rock landform using remote sensing

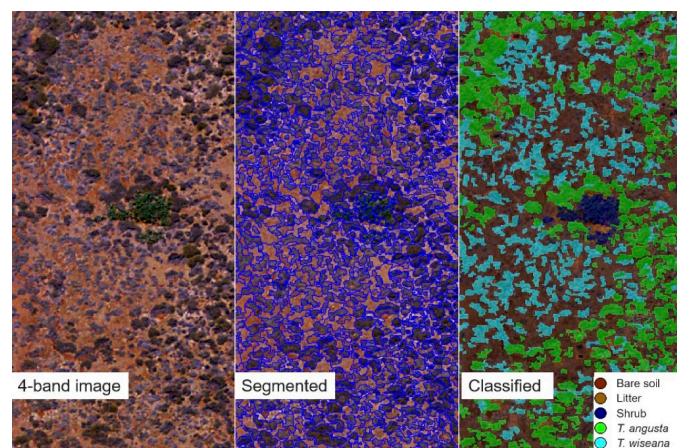


Fig 2: Detection of Triodia species using aerial imagery and object-based image analysis (OBIA)

For example, remote sensing of erosion on rehabilitated landforms is highly beneficial compared to traditional assessments, as the whole landform can be assessed with accurate metrics for gully erosion or landform subsidence (Fig 1). For vegetation, remote sensing currently cannot assess species diversity as comprehensively as on-ground methods. Even so, there are many examples of key native or introduced taxa being detected remotely. We've developed a robust protocol to detect key species of Triodia (spinifex) in northern Australia (Fig 2).

Further development in species delineation is likely to be rapid, but will require ground-truthing under different seasonal conditions.

Regulatory requirements for rehabilitated areas often focus on the return of biodiversity and reproductive capacity. But if the focus of completion criteria shifts towards increased spatial scale, rather than detailed community composition, do we risk losing information on functional capacity and resilience of rehabilitated ecosystems?

Detailed soil assessments that can inform rehabilitation outcomes are also at risk of being lost in a shift to remote sensing. While the obvious risk control measure is to combine remote sensing with on-ground monitoring, costs can be a roadblock.

Cost-effective options to combine on-ground and remote monitoring include:

- Modifying existing aerial imagery capture to include multi-spectral data, or to extend the area captured to include rehabilitated areas.
- Alternating remote sensing with on-ground assessment, or when both are required, field work time may be reduced.
- Using satellite imagery to 'go back in time' and demonstrate trends with change detection analysis.
- Using whole-site remote sensing in early stages of rehabilitation to detect problem areas, and thus reduce costs at closure.

To read the full article click [here](#). Authors: N.C. Banning, D.A. Jasper, D. Kinnear, S.J. Annison and G.S. Wiseman. For further information contact Natasha.Banning@stantec.com.

In the news



James Faithful (left), Rae Mackay (centre) and David Salmon (right). Image Courtesy: Hazelwood.

MLRA CEO visits Hazelwood

The new CEO of the Mine Land Rehabilitation Authority (MLRA), David Salmon, was introduced to the Hazelwood Rehabilitation Project. Mr Salmon and Prof. Rae Mackay, MLRA Board Chair, took up an invitation to tour the site to gain an understanding of the works taking place.

During the tour they looked at the mine and demolition works with Mine Technical Services Manager, James Faithful. Mr Salmon welcomed the tour which he said was very useful in understanding the size and different perspectives of the site. The MLRA is an important body in the context of the Latrobe Valley mines, as it continues a statutory role overseeing implementation of the Latrobe Valley Regional Rehabilitation Strategy.

For more information please visit the [Hazelwood Rehabilitation Project](#). Click here to read the [Hazelwood Community Update](#).

LVRRS Implementation Strategy progress

The Victorian Government, in consultation with mine operators and stakeholders, is progressing further studies to support mine rehabilitation planning. The [Latrobe Valley Regional Rehabilitation Strategy \(LVRRS\) newsletters](#) provide readers with progress updates every three months.

If you or a colleague wish to receive the Latrobe Valley Regional Rehabilitation Strategy newsletter, please subscribe [here](#).

Upcoming events

MLRA Webinar: Wednesday 28 July 2021 5:30pm - 6:30pm

Join the Mine Land Rehabilitation Authority (MLRA) with David Salmon, MLRA CEO and Rhonda Hastie, Technical Advisor discussing the MLRA's development over the past year, and the timeline for mine land rehabilitation. A Q&A session will follow the presentations.

Part I: How the MLRA has developed over the last year. David will provide an overview of the MLRA's primary activities and achievements since its inception in June 2020 and will provide a brief outline of its future development.

Part II: The timeline for mine land rehabilitation. Rhonda will outline the likely timing and key phases of mine rehabilitation for the Latrobe Valley's three brown coal mines and the factors that may affect their delivery timeframes.

To register for the webinar, visit mineland.vic.gov.au or via [Eventbrite](#).

Get in touch

We are in the process of moving to our new office at 65 Church Street, Morwell.

You can call our team, who are working remotely, on 1800 571 966 during normal business hours, email contactus@mineland.vic.gov.au, or visit our website at mineland.vic.gov.au.

Please feel free to connect with us on Facebook [@MLRAVictoria](#) or on [LinkedIn MLRA Victoria](#).

