

Our Research Portfolio



MRIWA's research portfolio advanced minerals innovation through collaborative projects addressing exploration, resource development, processing, infrastructure, remediation and workforce capability. Our funding strengthened Western Australia's competitiveness, delivered practical outcomes, attracted co-investment and supported sustainable growth across the sector, statewide priorities.

Research Portfolio

The Minerals Research Institute of Western Australia supports the State's economic position by fostering and delivering minerals research that matters, working across industry, government and academia to turn ideas into practical outcomes which deliver benefit to the State.

Whether supporting new exploration technologies, advancing processing methods, or enabling new mineral products and markets, MRIWA ensures research moves beyond theory and into real-world application. Through targeted funding and collaboration, the Institute delivers applied research to build capability and generate economic and social value for the State, strengthening Western Australia's global competitiveness in mining and resources.

MRIWA is helping shape the future of responsible resource development. Its research priorities include Green Steel, Net Zero Emission Mining, Exploration Amplification, Precision and Low Impact Mining, Alternative Use of Tailings and Waste and Critical Minerals. By supporting innovations such as cleaner processing and circular approaches to resources, MRIWA contributes to a mining sector that is more efficient, resilient and environmentally responsible.

Western Australia's economic resilience and sovereign capability are closely tied to its minerals sector, and MRIWA plays a critical role in strengthening that foundation. The Institute funds and coordinates research across the full value chain, from discovery to extraction, processing and market development, supporting critical minerals, emerging technologies and new supply chains essential for future industries. Through its programs, MRIWA helps ensure the State remains a global leader in resources while adapting to changing economic and technological conditions.

Beyond research outcomes, MRIWA invests in people and knowledge systems that sustain long-term growth. Through scholarships, partnerships and industry collaboration, the Institute supports skills development, workforce capability and knowledge transfer, ensuring innovation is embedded across the sector. Its programs connect researchers with industry challenges, accelerating the uptake of new technologies and strengthening Western Australia's research ecosystem.

Research does more than solve today's technical challenges, it underpins the future of the State. MRIWA's work demonstrates how science and innovation can drive prosperity, sustainability and opportunity for Western Australia.

The Institute's 2025-26 Annual Report highlights a strong pipeline of collaborative projects and continued delivery of measurable benefits, reflecting its role in shaping a modern, innovative and internationally competitive minerals sector.

As Western Australia navigates evolving global conditions, MRIWA continues to respond to emerging economic, technological and environmental trends. By aligning its research with future risks and opportunities, the Institute ensures the minerals research system remains responsive, forward-looking and capable of addressing the challenges of the next decade and beyond.

Impact Assessment

An independent impact assessment of MRIWA funding was completed in 2025-26. The assessment evaluated the outcomes and benefits generated through MRIWA research investments and to demonstrate the value delivered to Western Australia. The assessment examined how MRIWA-funded projects contribute to economic growth, improved industry performance, enhanced safety, environmental sustainability and the development of research capability across the resources sector.

Building on previous assessments, the study analysed a portfolio of MRIWA-funded projects completed between 2018–19 and 2023–24. Using cost–benefit analysis modelling, Deloitte Access Economics quantified the economic value generated through improved operational efficiency, stronger safety outcomes and reduced environmental impacts. The assessment also considered broader benefits arising from industry collaboration, knowledge creation and the translation of research into practical industry applications.

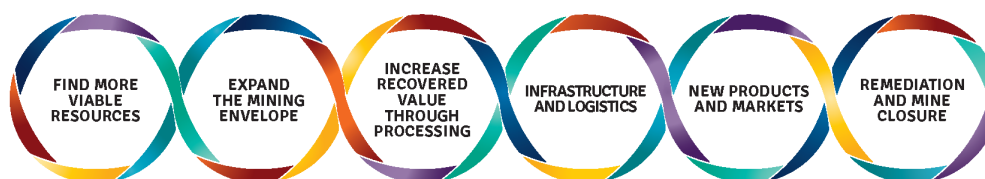
Nine case studies, comprising both quantitative and qualitative analyses, were selected to illustrate the diverse impacts of MRIWA-funded research across the minerals sector and demonstrate the breadth of benefits delivered through collaborative innovation.

Key Findings



Research Portfolio Summary 2025-2026

Research Priority Plan



No. Projects	16	7	17	2	12	5
MRIWA Contribution¹	\$3.8 M	\$1.1 M	\$5.6 M	\$275 K	\$2.1 M	\$791 K
Third-Party Contribution	\$21.6 M	\$1.4 M	\$12 M	\$250 K	\$4.1 M	\$7.6 M
Total Research Value	\$25.4 M	\$2.5 M	\$17.6 M	\$525 K	\$6.2 M	\$8.4 M

*Note: Due to rounding, some totals may not correspond with the sum of the separate figures
Does not include scholarships*

The Research Priority Plan (RPP) is the Institute's strategic framework that guides investment in minerals research to maximise long-term economic, social and environmental benefits for Western Australia.

The RPP identifies medium- to long-term knowledge and technology needs of the State's minerals industry, ensuring that research funding addresses critical challenges and opportunities impacting sector performance and competitiveness.

The Plan targets areas where coordinated research can:

- Remove barriers limiting the full economic potential of the minerals sector
- Enable innovation and technological advancement
- Strengthen global competitiveness and sustainability outcomes

The RPP is currently under review to ensure it remains aligned with evolving industry needs, emerging technologies and global trends. In parallel, legislative amendments to expand the Institute's remit to include clean energy and emissions reduction research will be reflected in a revised RPP, ensuring future research priorities are captured in the RPP.

¹ Includes the contribution from Department of Energy and Economic Diversification for the FBI CRC (\$500,000) and HILT CRC (\$1 million)

PROGRAM 1: Find More Viable Resources

As near-surface mineral deposits become increasingly depleted, Western Australia faces the challenge of discovering new economically viable resources in concealed and complex geological settings. Program 1 focuses on improving exploration productivity through advanced mineral systems science, detection technologies, data analytics, and predictive modelling.

Key priorities include enhancing orebody targeting, characterising geological structures, developing new exploration datasets, and applying machine learning to resource prediction. The program also supports efficient regulatory processes, sustainable exploration practices, and workforce development. These initiatives aim to attract investment, strengthen exploration capability, reduce discovery risk, and position Western Australia as a global leader in mineral exploration and resource discovery.



PROGRAM 2: Expand the Mining Envelope

Future mineral resources in Western Australia are increasingly located in deeper, more complex geological environments, requiring innovative and cost-effective extraction methods. Program 2 focuses on expanding the mining envelope through advanced extraction systems, geotechnical engineering, automation, artificial intelligence, and machine learning technologies.

Key priorities include improving mining in highly stressed rock conditions, enhancing recovery from low-grade deposits, enabling precision mining, and strengthening real-time data-driven decision-making. The program also promotes lower-emission energy use, efficient regulatory processes, improved safety and environmental outcomes, and workforce capability development. These initiatives aim to increase productivity, extend mine life, reduce costs, and position Western Australia as a global leader in mining innovation.



PROGRAM 3: Increase Recovered Value Through Processing

More complex and lower grade orebodies, rising energy costs, and environmental pressures are driving the need for advanced mineral processing technologies. Program 3 focuses on increasing yield, throughput, and resource efficiency by integrating research across operational areas. Priorities include developing innovative processing technologies, AI and machine learning applications, predictive modelling, and interoperability standards.

The program aims to improve recovery from low grade ores and waste streams, reduce costs and emissions, strengthen safety and sustainability outcomes, streamline regulatory processes, enhance asset reliability, and build a skilled workforce. Together, these initiatives will position Western Australia as a global leader in mineral processing innovation.



PROGRAM 4: Infrastructure and Logistics

Western Australia's export-focused mining industry relies on extensive infrastructure and logistics networks that require significant long-term planning and investment. Program 4 focuses on improving supply chain efficiency, haulage, export logistics, communications, and positioning technologies to reduce costs and support increasing automation.

Key priorities include enhancing data transfer capabilities, reducing network bandwidth requirements, improving geo-positioning accuracy, developing scalable mapping and modelling platforms, and adopting lower-emission energy sources. The program also promotes safer, more sustainable infrastructure planning by considering environmental impacts and post-mining land use. These initiatives will optimise shared infrastructure, improve operational efficiency, and support the future needs of the mining sector.



PROGRAM 5: New Products and Markets

Rapid growth in advanced technologies is increasing demand for critical minerals essential to renewable energy, batteries, electronics, telecommunications, and defence applications. Program 5 focuses on developing new products, markets, and industries by leveraging Western Australia's diverse mineral resources. Priorities include strategic market foresight, innovative downstream processing technologies, conversion of mine waste into valuable products, improved understanding of future supply and demand, and adoption of lower-emission energy sources.

The program also supports efficient regulatory frameworks, sustainable production practices, and workforce development. These initiatives aim to create premium products, expand domestic processing, and position Western Australia as a leading global supplier of critical minerals.



PROGRAM 6: Remediation and Mine Closure

As more Western Australian mines approach closure, uncertainty around land relinquishment, rehabilitation outcomes, and long-term liabilities highlights the need for improved mine closure strategies. Program 6 focuses on developing innovative technologies and approaches for mine remediation, sustainable post-mining land use, and evidence-based decision-making.

Key priorities include preventing acid mine drainage, treating tailings, improving data management and predictive capabilities, streamlining regulatory processes, and enhancing environmental and social outcomes. The program aims to reduce remediation costs, minimise risks and environmental impacts, create positive post-mining legacies for communities, and position Western Australia as a global leader in mine closure and rehabilitation.



Our Focus Areas

MRIWA Focus Areas are targeted initiatives designed to stimulate and enhance high-value activities that benefit Western Australia. These areas may address specific segments of the mining value chain or span the entire chain, depending on where the greatest impact can be achieved.

MRIWA uses these Focus Areas to foster collaboration between industry, academia, and government, aiming to activate innovation networks, support research, and attract investment. Each Focus Area has its own set of objectives, calls to action, and expected outcomes.

Focus Area Summary 2025-2026

	Alternative Use of Tailings and Waste	Critical Minerals	Exploration Amplification	Green Steel	Net Zero Emission Mining	Precision and Low Impact Mining
No. Projects²	9	14	16	5	3	4
MRIWA Contribution	\$651 K	\$6.0 M	\$3.8 M	\$680 K	\$460 K	\$735 K
Third-Party Contribution	\$1.3 M	\$7.3 M	\$21.6 M	\$5.1M	\$2.7 M	\$585 K
Total Research Value	\$1.96 M	\$13.3 M	\$25.4M	\$5.8 M	\$3.2 M	\$1.3M

² Active projects only; drawdown amounts included; Includes scholarships; does not include as yet unallocated funds within CRCs/ Research Centres

Alternative Use of Tailings and Waste

Mining generates some of the world's largest industrial waste streams, and Western Australia's continued growth means that volume will keep rising. At the same time, tailings and residual materials once written off as waste are increasingly recognised as a source of latent value containing recoverable metals, usable bulk material, and untapped potential for carbon capture. MRIWA's Alternative Use of Tailings and Waste focus area is directed at turning that liability into an asset.

Problem

Without effective reprocessing and valorisation pathways, tailings and mine waste remain a long-term environmental liability rather than an asset. They consume land for storage, pose risks to surrounding ecosystems, and leave value bearing material permanently unrecovered.

Objective

To recover critical minerals from tailings, upcycle and downcycle mine waste into valuable construction materials, and investigate accelerated mineral carbonation for permanent carbon capture. Underpinning this work is a commitment to circular economy thinking, turning mine waste from a disposal liability into a valuable resource.

2025-26 Achievements

Advancement of the beneficial reuse of mine waste, spanning construction sand alternatives and carbon-negative mineral carbonation, generating evidence to support regulatory frameworks and scalable tailings management:

- Alternative Sands (M10469, M10607): Advanced characterisation, modelling, and field trials of de-lithiated beta-spodumene (DBS) as a virgin sand alternative for infrastructure and roads, generating dust, groundwater, and lithium mobilisation data to inform regulatory frameworks for industrial tailings reuse.
- Mineral Carbonation for CO₂ Sequestration (M10624, M10619): Identified mineralogical properties supporting carbonation potential and reduced acid mine drainage (AMD) risk and developed a hybrid electrocoagulation–carbonation–membrane system for combined water treatment, metal removal, and CO₂ sequestration — progressing a scalable pathway for carbon-negative tailings management.



Investigating the Valorisation Potential of Mine Waste for Mineral Carbonation

THE CHALLENGE

The challenge for Western Australian mining operations is to convert large volumes of tailings from a long-term environmental liability into a practical asset for carbon dioxide removal. While mineral carbonation is a promising pathway, implementation is constrained by limited site-specific data on tailings mineralogy, geochemistry, particle size and storage characteristics, making it difficult to prioritise facilities, quantify CO₂ uptake potential, and design scalable processing routes.

Program 6 – Remediation & mine closure

STATUS: Completed³

Project No: M10615

KEY FINDINGS

This project delivered a desktop-based assessment of WA tailings resources for mineral carbonation by integrating mine-waste databases (MINEDEX, Atlas of Australian Re-mining Potential, Global Tailings Portal) with Geological Survey of Western Australia (GSWA) geological mapping and the polygon-based Mining Residue dataset.

A Geographic Information System (GIS) screening workflow was used to identify Tailings Storage Facility (TSF)s located within mafic–ultramafic lithologies (as proxies for Mg- and Ca-rich silicates), and international pilot-scale evidence was synthesised into a multi-criteria conceptual framework to guide future site ranking, data collection, and pilot design.

BENEFIT TO WA

The work strengthens WA's evidence base for carbon-neutral mining by identifying where the State's largest and most prospective tailings inventories coincide with favourable host lithologies, and by clarifying the key data fields needed to assess sequestration potential with confidence.

The outcomes allow regulators and industry target sampling and pilot trials (particularly for nickel and diamond tailings), accelerate development of a fit-for-purpose tailings database, and support future investments that reduce closure liabilities while creating new CO₂ utilisation and storage opportunities in WA.

Lead Organisation

University of Western Australia

Research Contact

Nikhil Kumar

Sponsors

Fully funded by MRIWA

Total Research Value

\$18,000

MRIWA Contribution

\$18,000

Funding Digital Object Identifier (DOI)

10.71342/113894459559

Report DOI

10.71342/138881155988

³ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/investigating-the-valorisation-potential-of-mine-waste-for-mineral-carbonation/>

Evaluating the Potential of Mine Waste for Construction Solutions

THE CHALLENGE

The challenge is finding low-cost ways to turn mine waste, particularly iron ore and gold tailings into construction materials that meet Australian Standards. This is made more difficult by variable tailings quality between sites, limited long-term durability and leaching data, and the need to scale laboratory results into practical applications across Western Australia.

Program 5 – New Products and Markets

STATUS: Completed⁴

Project No: M10617

KEY FINDINGS

This project synthesised peer-reviewed literature and case studies to evaluate where and how tailings can substitute conventional construction inputs.

The review found tailings can be effective as fine aggregate in concrete, with an optimum replacement range commonly improving compressive strength, but with decreasing workability as replacement increases.

Use as a supplementary cementitious material (SCM) generally reduced compressive strength unless activation methods were employed. Brick outcomes were more variable and appeared more sensitive to site-specific chemistry and particle-size effects, highlighting the need for targeted validation.

BENEFIT TO WA

The project provides a consolidated evidence base to guide WA stakeholders on high-potential tailings reuse pathways particularly aggregate substitution in concrete supporting reduced tailings storage burden and enabling circular-economy outcomes. By clarifying technical trends, standards considerations, and key knowledge gaps (durability, leaching, and WA site-specific testing), the findings can help prioritise future research and de-risk pilot trials, with the longer-term potential to lower material costs and environmental impacts across WA's mining and construction sectors.

Lead Organisation

University of Western Australia

Research Contact

Sarah Scott

Sponsors

Fully funded by MRIWA

Total Research Value

\$13,500

MRIWA Contribution

\$13,500

Funding DOI

10.71342/533138389000

Report DOI

10.71342/776967846322

⁴ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/evaluating-the-potential-of-mine-waste-for-construction-solutions/>

Critical Minerals

As demand for critical minerals grows and grades decline, Western Australia's advantage will depend less on extraction and more on recovery, processing, and value creation. MRIWA's Critical Minerals focus area is helping close that gap.

Problem

Western Australia holds significant critical mineral reserves but limited midstream and downstream processing capacity. Without coordinated investment in recovery and processing technology, the State risks losing higher-value supply chain activity to other jurisdictions as global competition intensifies.

Objective

To improve recovery and processing efficiency across critical mineral ore bodies and tailings, build local processing and refining capability so that more value is captured onshore, reduce waste and environmental impact across the value chain, and strengthen Western Australia's position in global value-added critical minerals supply chain.

2025-26 Achievements

As global demand for critical minerals accelerates and grades decline, Western Australia's position as a major resource holder is no longer sufficient on its own.

Competitive advantage now depends on what happens after extraction: how efficiently minerals are recovered, how much processing occurs onshore, how effectively waste streams are converted into value, and how far the State moves into higher-value downstream processing rather than exporting raw material.

The Critical Minerals focus area achieved strong technical and commercial progress across rubidium, lithium, and rare earth element projects:

- **Rubidium (M10623):** Developed a novel extraction process achieving up to 99% leach recovery and 89% rubidium extraction, while reducing reagent use by 67% and operating temperature by 200°C. The project is now at pilot scale, with an international patent filed.
- **Lithium (M10521):** Advanced the first application of Direct Lithium Extraction (DLE) to WA hard rock spodumene. Phase 1 reached TRL 3 and generated two patents. Phase 2 has attracted \$1.23 million in industry co-investment alongside MRIWA support.
- **Rare Earths (M10528):** Completed a leading study of organic acid leaching for Australian clay-hosted rare earth deposits. Testing achieved up to 90% rare earth oxide recovery within 24 hours, providing a strong platform for future processing development.



The effect of water quality on rare earth minerals flotation

THE CHALLENGE

Developing effective alternative water treatment methods to replace the costly reverse osmosis-purified water currently used in processing. This reliance on an expensive solution hampers operational efficiency and drives up costs for mining companies.

Program 3 – Increase recovered value through processing

STATUS: Completed⁵

Project No: M0537

KEY FINDINGS

This research highlighted the significant adverse effects of dissolved ions, acting as impurities, on rare-earth mineral flotation. The interaction of divalent cations with flotation reagents and the alteration of pulp rheology by anions in the flotation pulp both contributed to reduced separation efficiency between valuable minerals and gangue.

BENEFIT TO WA

The project provided insights into how water quality affects processing efficiency in rare-earth mining in WA. It also suggested alternative water treatment methods to lower costs. This research may encourage companies to explore lower-grade deposits if alternative water sources are available, addressing water scarcity issues.

Lead Organisation

Curtin University

Research Contact

Bogale Tadesse

Sponsors

Lynas Rare Earths Limited

Total Research Value

\$210,000

MRIWA Contribution

\$70,000

Funding DOI

10.71342/837210245430

Report DOI

10.71342/642754334956

⁵ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/the-effect-of-water-quality-on-rare-earth-minerals-flotation/>

New Opportunities for the PGM Industry in WA

THE CHALLENGE

Platinum Group Metals (PGMs) are needed for a range of new applications including hydrogen electrolysis and industrial chemical production. In Western Australia the industry is not well understood despite the abundance of resources.

Program 1 – Increase recovered value through processing

STATUS: Completed⁶

Project No: M10481

KEY FINDINGS

Platinum Group Metals (PGMs) are found in the Yilgarn and Kimberley regions of Western Australia. They are also present as co-products of nickel, lithium, vanadium, and gold production.

The key resource holders are Podium Minerals, Chalice Mining, and Future Metals. The commercially viable portions of these resources contain ruthenium, rhodium, and iridium (PGM 6E). It is unlikely that platinum and palladium alone would support a viable industry in Western Australia. There are legacy resources within BHP Nickel West nickel concentrate and smelter tailings that may hold notable value.

Modelling has shown that achieving a saleable PGM concentrate of approximately 600 ppm would require virgin resources to be supplemented by lower-cost PGM 6E recovery from tailings. A smelter operated through a consortium of producers is a likely pathway for further study.

BENEFIT TO WA

The benefit of a PGM industry would be to support the co-product streams of gold, nickel, and lithium production, making these minerals more economic while creating a new industry.

A collaborative processing centre in the Mid-West and Eastern Goldfields would be expected to generate significant long-term revenue for the state and help support other industries by providing a second revenue stream.

Lead Organisation

ACIL Allen

Research Contact

Ryan Buckland

Sponsors

Fully funded by MRIWA

Total Research Value

\$292,678

MRIWA Contribution

\$292,678

⁶ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/new-opportunities-for-the-pgm-industry-in-wa/>

Green Steel

The iron ore industry is the State's largest and most important industry, providing direct and indirect economic and social contributions which are greater than any other industry to the State. Its contribution is also significant to the national economy.

With the steel industry generating more than 7% of global carbon emissions, there is a significant focus on the development of green steel technology.

Problem

Western Australia iron ores are predominately used in the blast furnace pathway with corresponding high emission profiles using coal.

Understanding the use of these ores in lower emissions iron pathways is not yet mature. Ore Processing knowhow, new technologies and use of WA energy options needs further research and then demonstration at scale. The iron ore requirements of the greener iron future are needed.

Objective

MRIWA's objectives for the Green Steel Focus Area is to

1. Support Western Australian process facilities and capabilities for multiple green steel producers.
2. Support development of low emission processing technologies for Australian iron ores.
3. Develop opportunities for downstream industries and innovation to support green steel.

The intended outcomes are to increase economic value from WA's iron ore resources, increase royalties for the state of WA and to develop a green steel practice and knowledge base in WA.

2025-26 Achievements

Release of an updated green steel model including electric smelting scenarios is now online and being used as a workshop and industry resource tool.

MRIWA has given support to industry and government for the NEOSMELT Electric Smelting Furnace project and CALIX direct reduction project which are due to final approval in 2026.

MRIWA continues to support the Heavy Industry Low-carbon Transition Cooperative Research Centre (HILT CRC) (on behalf of the Department of Energy and Economic Diversification (DEED)) and supports 6 active drawdown projects.

Projects completed include:

- M10497 Green pyromet/hydromet pathways.
- M10504 The upgrading of iron ore for DRI production using products from seawater.
- M10505 Intermediate product exports for Australia-China green steel.
- M10506 Analysis of market, cost and locational factors for green iron and steel in Australia.



Analysis of market, cost and locational factors for green iron and steel in Australia

THE CHALLENGE

Iron and steel production contributes over 7% of global CO₂ emissions. While demand for green alternatives is rising, high costs and uncertain market support for low-carbon processes remain major barriers.

Program 5 – New products and markets

STATUS: Completed⁷

Project No: M10506

KEY FINDINGS

This project assessed locational factors, scrap availability, and market dynamics to clarify future iron ore needs.

Locational Factors

- Availability and cost of energy
- Regulation & policies
- Ore types
- Labour costs
- Proximity to facilities
- Transport infrastructure
- H₂ storage/transport costs
- Current production setup

Scrap Availability

Steel scrap recycling and remelting plays a vital role in the overall decarbonisation strategy of iron and steelmaking if shifting from Blast Furnace (BF) - Basic Oxygen Furnace (BOF) route to Electric Arc Furnace (EAF) route pathways is to be taken. The project work reveals approximately 4 million tonnes of steel scrap were recovered annually in Australia, and that on average, Victoria and New South Wales together contribute about 63% of the total. Between 2016 to 2020, roughly half of steel scrap originated from Municipal and Solid Waste collection while 30% and 20% originated from Construction and Demolition, and Commercial and Industrial sources, respectively. Roughly 2 Mt of scrap was utilised locally, and the other 2 Mt was exported overseas with Bangladesh, Vietnam, and Indonesia the top three export destinations.

Market Dynamics

Share of steel demand that is green is expected to rise from 18%-46% in 2030 to 41%-76% in 2050. Regional demand for green steel led by China, followed by Europe, North America, and Southeast Asia. Benchmarking uncovers scenarios with significant projected shortfalls in regional supply of green steel particularly in China. Demand for primary green steel in the automotive industries led by China, followed by Japan, Korea and Taiwan (JKT).

BENEFIT TO WA

Understanding global green iron markets will help WA producers align with downstream investors, enabling local processing technologies and boosting Australia's competitiveness in low-carbon steel exports.

Lead Organisation

The Australian National University

Queensland University of Technology

Swinburne University of Technology

University of Adelaide

Research Contact

Frank Jotzo

Sponsors

HILT CRC

Onesteel Manufacturing Pty Ltd

FMG Procurement Services Pty Ltd

Roy Hill Holdings Pty Ltd

Total Research Value

\$261,517

MRIWA Contribution

\$20,000

Funding DOI

10.71342/845420259982

⁷ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/analysis-of-market-cost-and-locational-factors-for-green-iron-and-steel-in-australia-2/>

Intermediate product exports for Australia-China green steel

THE CHALLENGE

Direct Reduced Iron (DRI) production is set to grow from 8% to 24% by 2050. To make this production economically viable, higher grade iron ores will be required. An increasing proportion of mined iron ore in Western Australia will not be of suitable grade for DRI.

Program 5 – New products and markets

STATUS: Completed⁸

Project No: M10505

KEY FINDINGS

The project delivered techno-economic and environmental models of individual process steps in conventional as well as decarbonised iron and steel making scenarios. The modelling allowed different steps of the process to occur in different countries, including with Australian exports of intermediate products such as 30, 50 or 70% metallised DRI.

Emissions from different process steps were determined in a Life Cycle Assessment (LCA). Transport costs and capacity constraints are included in a highly granular network representation. These components were combined in an optimisation model to find cost-optimal solutions for different levels of decarbonisation of Chinese steel demand.

The model results show the Electric Smelter Furnace (ESF) will be of key importance to the cost-competitiveness of Australian iron ore in future green steel value chains, regardless of whether the production of iron occurs in Australia or China. It suggests that in scenarios with high green steel demand in China, Australian iron ore consumption would climb together with ESF capacity, from near zero in scenario with no or very little ESF capacity, to 380 Mt of Australian iron ore consumption in a scenario with an ESF capacity of 400 Mt or above. It is therefore imperative Australian industry and government work to stimulate the technological development of the ESF, which is currently still in the demonstration stage, and help support their industrial-scale rollout.

BENEFIT TO WA

The assessment provides a basis for future decision makers and for policy makers to determine the best pathways for green iron and steel.

The results highlight the role for further technology development, such as novel technologies for beneficiation or reduction via electrolysis of ores, in improving the competitiveness of Australian ores in a future Chinese market for green steel.

They also highlight the importance of exploring the development of green iron markets beyond China, as the results presented here say nothing about the cost-competitiveness of Australian green iron production for supply into the Japanese, Korean, Indian, Taiwanese, European, or other markets.

Lead Organisation

The Australian National University

Curtin University

Research Contact

Jorrit Gosens

Sponsors

HILT CRC

FMG Procurement Services Pty Ltd

Grange Resources (Tasmania) Pty Ltd Industry

Onesteel Manufacturing Pty Ltd

Roy Hill Holdings Pty Ltd

Total Research Value

\$254,461

MRIWA Contribution

\$20,000

Funding DOI

10.71342/017161370721

⁸ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/intermediate-product-exports-for-australia-china-green-steel-2/>

The upgrading of iron ore for DRI production using products from seawater

THE CHALLENGE

Direct Reduced Iron (DRI) production is set to grow from 8% to 24% by 2050. To make this production economically viable, higher grade iron ores will be required. An increasing proportion of mined iron ore in Western Australia will not be of suitable grade for DRI.

Program 3 – Increased recovery through processing

STATUS: Completed⁹

Project No: M10504

KEY FINDINGS

The use of renewable energy and reagents derived from seawater desalination brines has been investigated to upgrade treated and leached lower-grade waste iron ores. Removing impurities that affect steel quality, such as phosphorus and gangue minerals, could enable lower-cost steel production.

The results obtained from this study showed that silica and alumina levels could be reduced by more than 60%, while phosphorus levels could be reduced by up to 70%. By-products, including calcium-alumina-silicates produced during these trials, may also improve the economics of the process.

It was also found that pre-heating ores can lead to improved results, and that the combined processes could increase iron recoveries.

BENEFIT TO WA

If commercialised, this process will allow Western Australian ores to be increasingly used for DRI production by increasing iron grades. It will also produce significant quantities of potable water as a by-product, which is particularly valuable given that many iron ore resources are located in some of the driest parts of Western Australia.

Recovery of brines will greatly reduce the volume of brine requiring ocean disposal. The project outputs were used to progress Project M10522, which will apply these findings to the design of a potential pilot plant for a new brine processing technology.

Lead Organisation

Curtin University

Research Contact

Jacques Eksteen

Sponsors

HILT CRC

FMG Procurement Services Pty Ltd

Roy Hill Holdings Pty Ltd

Onesteel Manufacturing Pty Ltd

Total Research Value

\$455,000

MRIWA Contribution

\$20,000

⁹ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/the-upgrading-of-iron-ore-for-dri-production-using-products-from-seawater/>

Green pyromet/hydromet beneficiation pathways

THE CHALLENGE

Direct Reduced Iron (DRI) production is set to grow from 8% to 24% by 2050. To make this production economically viable, higher grade iron ores will be required. An increasing proportion of mined iron ore in Western Australia will not be of suitable grade for DRI.

Program 3 – Increased recovery through processing

STATUS: Completed¹⁰

Project No: M10497

KEY FINDINGS

This project explored the potential of renewable energy-powered beneficiation flowsheets to upgrade Pilbara Bedded Iron Deposit (BID), Channel Iron Deposit (CID) and Detrital Iron Deposit (DID) fine iron ores to greater than 65% Fe, and preferably greater than 67% Fe. The flowsheet options assessed included combined low- to mid-temperature pyrometallurgical-hydrometallurgical processes, pyrometallurgical-dry magnetic separation (DMS), low-temperature fluidised-bed magnetisation roasting (FBMR)-hydrometallurgical processing, and FBMR-DMS processing.

The performance of a novel, thermally assisted beneficiation process was demonstrated at pilot scale. The process combined a drop tube reactor (DTR) for flash heating with wet high-intensity magnetic separation (WHIMS) and was tested on a low-grade iron ore powder with an initial iron content of 54.8 wt.% Fe. An in-depth analysis was undertaken to assess the impact of flash heating on ore conversion, mineralogy, and associated chemical and physical characteristics.

The main findings from the study were as follows:

- The proposed process produced a hematite-rich concentrate using moderate heating temperatures of 400-500°C, demonstrating effective ore upgrade performance.
- Iron grades of up to 60 wt.% Fe were achieved, with iron recoveries exceeding 90%.
- The process generated a high specific surface area (SSA), reaching up to five times that of the untreated ore.
- Ore conversion, mineralogy, and chemical and physical properties were significantly influenced by both heating rate and particle residence time.
- Samples subjected to flash heating in the DTR exhibited different thermal decomposition behaviour from samples heated at slower rates in a thermogravimetric analyser (TGA).
- These differences resulted in variations in mineralogy and product characteristics, including measured SSA values and SSA-conversion relationships.
- The degree of calcination was lower in samples processed in the DTR than in those heated in the TGA.

BENEFIT TO WA

This project has the potential to enable more efficient upgrading of Western Australian iron ores and support the increased utilisation of Pilbara goethite ores in downstream processing. This includes applications in pellet production, DRI manufacture, and green iron production.

Lead Organisation

University of Adelaide

Research Contact

Alfonso Chinnici

Sponsors

HILT CRC

Onesteel Manufacturing Pty Ltd

FMG Procurement Services Pty Ltd

Roy Hill Holdings Pty Ltd

CALIX Limited

South32

Total Research Value

\$504,350

MRIWA Contribution

\$20,000

¹⁰ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/green-pyromet-hydromet-pathways/>

Precision and Low Impact Mining

Western Australia's mining industry is under increasing pressure to improve productivity while reducing environmental impacts. Maintaining competitiveness requires more precise resource extraction, reduced waste and disturbance, and safer, more efficient operations. MRIWA's Precision and Low Impact Mining (PLIM) focus area supports the development and adoption of technologies and practices that enable this transition.

Problem

The adoption of precision mining technologies remains fragmented, with limited integration of high-resolution data and ongoing gaps between research and operational implementation. These challenges can reduce productivity and contribute to increased waste, energy and water consumption, and environmental and operational risks.

Objective

To improve resource extraction efficiency through advanced technologies and data-driven approaches, while reducing waste, disturbance, and emissions. The focus area aims to accelerate the delivery of practical mining solutions that enhance productivity, environmental performance, and the long-term competitiveness of Western Australia's mining sector.

2025-26 Achievements

The PLIM portfolio delivered advances in mine optimisation, precision technologies, automation, and environmental management.

Key achievements include:

- Sustainable optimisation of mining complexes through innovative algorithms (M10430): Improved mining selectivity through advanced optimisation algorithms.
- OptiClimo Precision Drill Alignment System (M10660): Enhanced drilling accuracy and data quality to reduce dilution and improve resource recovery.
- Corrosion Monitoring and Protection System (M10585) and Automated Flange Bolting Robot (M10529): Progressed automation and digital technologies towards operational deployment, supporting safer and more efficient mining operations.
- AMD/NMD Site Remediation and Closure (M10442) and Mine Pit Lake Assessment and Management (M10458): Delivered tools and knowledge to improve mine closure outcomes and support sustainable post-mining land use.



Precision and Low Impact Mining Technologies Inventory

THE CHALLENGE

To ensure the minerals industry meets Environmental, Social and Governance (ESG) principles, a focus on responsible mining practices, reduced footprints and mitigation of environmental impacts are essential. Despite technological advancements, legislative bodies and research institutes lack knowledge on novel and emerging Precision and Low Impact Mining (PLIM) technologies.

Program 1 – Expand the mining envelope

STATUS: Completed¹¹

Project No: M10599

KEY FINDINGS

In Western Australia, underground and solution mining exhibited significantly higher extraction and spatial precision than open pit mining. Underground mining also demonstrated the lowest overall environmental impact, while solution mining achieved comparable results.

The greatest potential to improve material extraction precision was demonstrated via phyto-mining, solution mining, and in-situ recovery. Autonomous haulage, dry stacking and the Jameson Concentrator demonstrated greater reductions in disturbance footprints compared to conventional technologies. Adoption barriers included scalability, geological suitability and groundwater contamination risks.

BENEFIT TO WA

Preliminary quantitative baselines to characterise the Western Australian mining industry were developed. It established quantifiable precision and environmental impact metrics to support the identification of potential PLIM technologies, providing a foundation for strategic decision making on future research investments in technologies with the greatest environmental benefit.

Lead Organisation

University of Western Australia (UWA)

Research Contact

Keely Gausten

Sponsors

Fully funded by MRIWA

Total Research Value

\$18,000

MRIWA Contribution

\$18,000

¹¹ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/precision-and-low-impact-mining-technologies-inventory/>

Algae-based technologies for improved environmental outcomes and sustainable post-mining futures

THE CHALLENGE

To use algae to turn mine water and waste into tools for clean-up, carbon reduction and lasting post-mining opportunities for communities and industry.

Program 6 – Remediation & mine closure

STATUS: Completed¹²

Project No: 10501

KEY FINDINGS

Algae can safely grow in many mine-affected waters and be used to treat contaminated water, capture carbon and stabilise mine waste.

Further, algae can support dust control, soil recovery and faster rehabilitation, while producing useful products such as bio-fertilisers and other bio-products.

Together, these findings demonstrate a practical pathway to turn ongoing mine liabilities into sustainable environmental and economic assets.

BENEFIT TO WA

Algae-based technologies help reduce mine closure costs by improving water treatment and stabilising mine waste, which are major cost drivers in rehabilitation. For example, algae can remove contaminants and increase pH in mine water, reducing reliance on chemicals.

Lead Organisation

Commonwealth Scientific Industrial Research Organisation (CSIRO)

Research Contact

Anna Kaksonen

Sponsors

CRC for Transformations in Mining Economies (CRC TiME)

Fortescue Ltd T/As Fortescue Metals Group Ltd

Heidelberg Materials Australia Pty Ltd T/As Hanson Construction Materials

Rio Tinto Services Limited

South32 Group Operations Pty Ltd

Department of Environment Science and Innovation (Office of the Queensland Mine Rehabilitation Commissioner)

Energy Australia Yallourn Pty Ltd

Murdoch University

Total Research Value

\$270,000

MRIWA Contribution

\$30,000

¹² <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/algae-based-technologies-for-improved-environmental-outcomes-and-sustainable-post-mining-futures/>

Towards a Mechanistic Understanding of Electrokinetic In Situ Leaching

THE CHALLENGE

Electrokinetic In Situ Recovery (EK-ISR) has the potential to become a transformative mining technology through eliminating many of the problems threatening the industry's social license to operate. Upscaling and commercialisation of the technology need to be underpinned by a refined scientific understanding of the process.

Program 1 – Expand the mining envelope

STATUS: Completed.¹³

Project No: M0544

KEY FINDINGS

This work provided significant insights into the physical and geochemical processes by which EK-ISR of metals is controlled. Gold extraction efficiency varied significantly among tested ore types, with iron-oxide copper gold deposits relatively amenable to gold recovery while extraction was more challenging from sulfide-rich ores.

Favourable copper recoveries were obtained for all ore materials tested. Life cycle assessment indicates EK-ISR would deliver sustainability benefits with respect to both emissions and land use.

BENEFIT TO WA

EK-ISR will enable extraction of metals from a wide range of low-permeability media such as intact ore, clays and tailings without the need for excavation. This will provide access to otherwise stranded Western Australian assets that cannot be mined economically with conventional mining technologies, while reducing the environmental impact of mining.

Lead Organisation

University of Western Australia

Research Contact

Henning Prommer

Sponsors

BHP Billiton

Evolution Mining Ltd

Newcrest Mining Ltd

Newmont Mining Services Pty Ltd

Total Research Value

\$842,605

MRIWA Contribution

\$290,605

Report DOI

10.71342/428543721325

¹³ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/towards-a-mechanistic-understanding-of-electrokinetic-in-situ-leaching/>

Automatic Knowledge Extraction from Industrial Maintenance Short Text Using Deep Learning

THE CHALLENGE

Maintenance is essential for efficient operation and preventing asset failures which can present safety and environmental hazards, risk regulatory non-compliance and lead to significant financial loss. Within this context, the unstructured data captured by operations and maintenance technicians and stored in historical maintenance work order records is of immense value. The inherent value of these unstructured texts proves a compelling case for automated Information Extraction (IE) as the task of manually processing the data is fraught with challenges, such as large volume of generated content, unique linguistic characteristics and low quality of textual data, and complex technical nature of maintenance domain itself.

Program 1 – Remediation & mine closure

STATUS: Completed.¹⁴

Project No: M0508a

KEY FINDINGS

The thesis addresses these challenges by developing a novel annotation software, language resources, and methods tailored to applying Natural Language Processing (NLP) to short text descriptions of maintenance work order records. Two novel tools are presented:

- LexiClean: a multi-task annotation tool for lexical normalisation, enhancing text quality and preserving privacy; and
- QuickGraph: enabling collaborative, multi-task IE.

Leveraging of these tools, the development of MaintNorm, MaintIE and MaintNorm IE tools set the benchmarks for deep learning-based lexical normalisation and IE within the maintenance domain, specifically, entity recognition and relation extraction.

BENEFIT TO WA

The research proposes a novel method for constructing maintenance property graphs that systemically capture both explicit information and implicit domain knowledge through a combination of automated extraction and expert-guided annotation.

The thesis advances both the field of NLP within industrial maintenance and the practical extraction of actionable insights from maintenance records, paving the way for more informed asset management decision-making.

Lead Organisation

University of Western Australia

Research Contact

Tyler Bikaun

Sponsors

Fully funded by MRIWA

Total Research Value

\$120,000

MRIWA Contribution

\$120,000

Report DOI

10.26182/hhg8-ra38

¹⁴ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/automatic-knowledge-extraction-from-industrial-maintenance-short-text-using-deep-learning/>

Net Zero Emission Mining

Western Australia is on the cusp of a unique economic and global leadership opportunity through transforming its greenhouse-gas-intensive, export-focused mining industry into a world-leading exporter of low-emissions raw materials and value-added commodities.

Technological innovation holds the key to this opportunity, with significant investment in research, development and demonstration (RD&D) required to de-risk emerging technologies critical to overcoming the technical and commercial barriers to implementing low emissions technologies in the mining sector.

Problem

Western Australia's minerals industry is a major contributor to the State's carbon emissions.

Objective

Support decarbonisation of the resources sector to achieve the State Government's commitment to net zero emissions by 2050, and to ensuring our mineral exports remain competitive and our communities prosper in a low-emissions global economy.

2025-26 Achievements

MRIWA research in the Net Zero Emission Mining focus area delivered significant advances in the electrification of mine plant and equipment, low-emissions water treatment, and improving the efficiency of bulk material transport. Our work also developed an inventory of the research and development ecosystem supporting heavy industry decarbonisation in Western Australia.

Key achievements include:

- Development and testing of digital tools and intelligent battery control strategies for integrating renewable energy use at mine sites (M10443).
- Validation of an innovative energy-saving bulk-material conveyor system to Australian standards (M10549).
- Demonstration of a smart nature-based water treatment system to support the decarbonisation of water in mining (M10447).



Big Roller™, energy efficient overland conveying with negative marginal cost of abatement energy efficient overland conveyor development

THE CHALLENGE

Pilbara iron ore mines face growing pressure to cut carbon emissions as diesel haulage becomes more energy intensive. With practical electrification of the haulage fleet years away, a significant opportunity exists through the potential of larger-diameter conveyor rollers to deliver immediate energy efficiency improvements.

Program 5 – New products & markets

STATUS: Completed.¹⁵

Project No: M10549

KEY FINDINGS

Testing confirmed increasing conveyor idler roller diameter from the current standard dimensions of 152 mm to 508 mm reduces energy-wasting indentation rolling resistance by 68% for steel rollers and 57% for lightweight nylon composite rollers.

A commercial batch of 50 nylon rollers weighing under 25 kg was manufactured, establishing the potential for supplying rollers suitable for safe, practical field handling.

Relocatable conveyor ground modules incorporating larger-diameter rollers were independently validated to Australian structural standards.

BENEFIT TO WA

Installation of the Big Roller™ conveyor technology solution could support approximately 25 skilled WA jobs per project, and the technology creates significant IP export potential.

The demonstrated efficiency gains from the system could cut up to 1.5 MW of installed power demand or 12,500 tonnes of CO₂ annually per 13.5 km conveyor installed – providing the potential for rapid emissions savings.

Lead Organisation

Big Roller™ Overland Conveyor Company

Research Contact

Shawn Ryan

Sponsors

Big Roller™ Overland Conveyor Company

Total Research Value

\$500,000

MRIWA Contribution

\$250,000

¹⁵ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/big-roller-energy-efficient-overland-conveying-with-negative-marginal-cost-of-abatement-energy-efficient-overland-conveyor-development/>

Net Zero Research, Development & Deployment Roadmap Inventory

THE CHALLENGE	
The current WA heavy industry decarbonisation R&D landscape consists of multiple organisations and projects. The lack of a shared understanding poses a potential risk to long-term emissions reduction and the strategic direction for investment in the development of technologies crucial for decarbonising heavy industry in WA. This could impede effective and efficient use of public and private funding.	
Program 4 – Infrastructure & logistics	
STATUS: Completed ¹⁶	Project No: M10600
KEY FINDINGS	Lead Organisation
Findings indicate there is currently strong support for the development of a new low emissions economy in WA in iron and steel making, hydrogen and ammonia manufacturing, and cement and concrete production.	University of Western Australia
Funding gaps identified were linked to the uneven distribution of funding within universities-led research compared to industry led-research. An assessment found that a technology readiness gap between bench top laboratory component testing and pilot scale/demonstration plants (TRL 4 to TRL6/7).	Research Contact
Future research should focus on improving inventory maintenance and keeping pace with rapid research developments. Ongoing data collection, collation, and commitment to long-term management are essential for demonstrating the value of the inventory and sustaining stakeholder engagement. The use of machine learning, AI, and automated systems, using targeted keywords and known data sources, will be crucial for efficient and continuous data gathering.	Thi Bao Tram (Phoebe) Tran
Future work in expanding the inventory to include commercial and social readiness measures for better investment evaluation, with new parameters developed alongside stakeholders.	Sponsors
	Fully funded by MRIWA
	Total Research Value
	\$18,000
	MRIWA Contribution
	\$18,000
BENEFIT TO WA	Funding DOI
The inventory will provide an understanding of the heavy industry decarbonisation R&D landscape in WA, and could contribute to developing a strategic, coordinated direction for heavy industry RD&D investment.	10.71342/303515157895

¹⁶ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/net-zero-research-development-deployment-inventory/>

Cooling System for Retrofitted Electric Mining Truck (EPCA-E100 project)

THE CHALLENGE

Retrofitted electric haul trucks must operate reliably in extreme mining conditions, including very high ambient temperatures. Batteries and power electronics have narrower temperature limits than diesel engines, so a purpose-designed cooling system is essential to maintain performance, safety and component life.

Program 4 – Infrastructure & logistics

STATUS: Completed¹⁷

Project No: M10550

KEY FINDINGS

EPCA developed and tested a cooling system and control strategy for a retrofitted 100-tonne electric Caterpillar 777D truck. Mine-site testing demonstrated that coolant flow distribution (via orifice settings) can keep inverter temperatures below first-derating thresholds.

Results also showed that a battery thermal management chiller is not well suited to sustained high heat loads from motors/inverters, with cooling effectiveness reducing over time as thermal load exceeds chiller capacity.

BENEFIT TO WA

The work supports lower-emissions mining by enabling retrofit pathways for heavy haul trucks using a circular-economy approach. Improved thermal management helps electric haul trucks operate more reliably in WA's hot mining environments, accelerating electrification uptake and strengthening local METS capability and innovation.

Lead Organisation

Electric Power Conversions
Australia (EPCA)

Research Contact

Clayton Franklin

Sponsors

Electric Power Conversions
Australia (EPCA)

Total Research Value

\$500,000

MRIWA Contribution

\$250,000

Report DOI

10.71342/359794298652

¹⁷ <https://www.mriwa.wa.gov.au/news-and-events/cooling-system-designed-for-retrofitted-electric-mining-truck/>

Wetland in a Box (EnphytoBox®) - a smart water treatment system to support the decarbonisation of water in mining

THE CHALLENGE

Reducing the carbon footprint of water supply is an emerging issue for the WA mining sector, particularly in light of the challenge of transitioning to net-zero emissions. Scalable, net-zero emissions water treatment technologies with real-time monitoring and data-driven remote operational capabilities are needed across the sector.

Program 6 – Remediation & mine closure

STATUS: Completed¹⁸

Project No: M10447

KEY FINDINGS

Syrinx developed the EnPhytoBox®, a modular, net-zero wastewater treatment unit using nature-based methods. The EnPhytoBox® operates via an Industrial Internet of Things (IIoT) system enabling remote monitoring and control to allow real-time data visualisation and control of water quality and operations. Syrinx is now preparing to deploy the technology widely for uses including end-of-mine restoration.

BENEFIT TO WA

Deployment of the EnPhytoBox®, could deliver sustainable treatment of remote mine waste waters and enable data-driven sustainable water decisions within the mining and METS sectors.

The transparency of real-time data provided could also help improve relationships between mining and adjacent communities and sectors, supporting State and industry goals of reducing carbon emissions.

Lead Organisation

Syrinx Environmental Pty Ltd

Research Contact

Kathy Meney

Ljiljana Pantelic

Sponsors

Syrinx Environmental Pty Ltd

Total Research Value

\$86,600

MRIWA Contribution

\$43,400

Report DOI

10.71342/111134055303

¹⁸ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/wetland-in-a-box-enphyto-box-a-smart-water-treatment-system-to-support-the-decarbonisation-of-water-in-mining/>

Exploration Amplification

Advancing mineral exploration technology and knowledge, and the understanding of Western Australia's mineral endowment to reduce exploration risk and accelerate mineral resource discovery in Western Australia.

Problem

The future productivity of mineral exploration in Western Australia requires discovery and characterisation of ore bodies deeper below the surface and hidden from traditional methods of discovery, pushing industry to reduce both the cost and the environmental footprint of exploration.

Objective

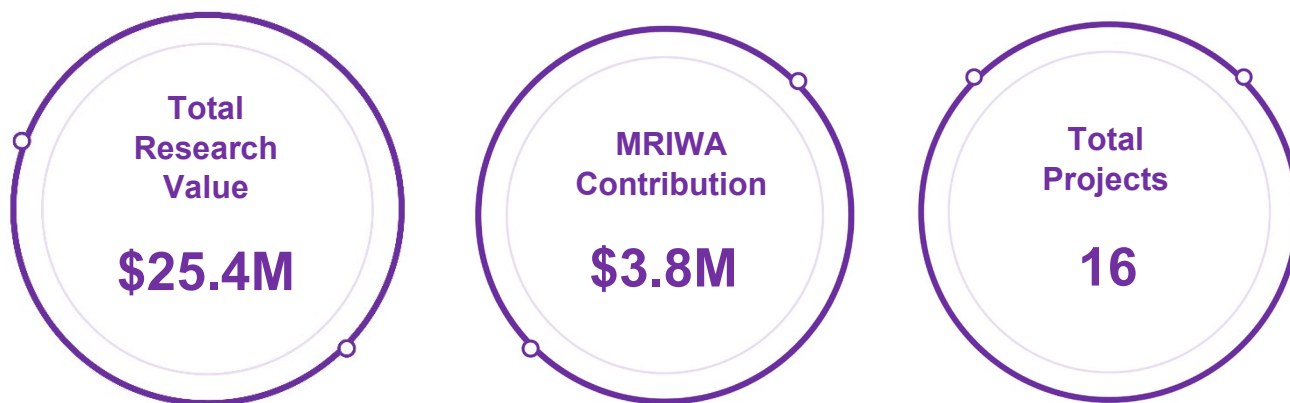
Amplification of exploration capacity and outcomes by accelerating the delivery and adoption of innovative research and development, strengthening capability pipelines, and positioning Western Australia as the home of next-generation exploration research and talent.

2025 -26 Achievements

Research projects in MRIWA's Exploration Amplification portfolio delivered new understanding of Western Australia's mineral endowment and advanced the development of innovative exploration technologies reducing the risk and uncertainty in discovering and developing new mineral resources in the state.

Key achievements include:

- Definition of a new integrated model for the development of high-grade gold mineralisation to help guide exploration and resource estimation in the WA gold sector (M10412).
- Application of new Machine Learning methods to deliver consistent and objective mapping of granitic rocks across the Yilgarn region – supporting exploration targeting for gold and critical mineral resources (M10587).
- Pre-commercial validation of a prototype coiled tubing (CT) drilling system for mineral exploration (M10444). Through lowering the cost and environmental footprint of drilling, this system offers a path to supporting future mineral exploration in Western Australia, where many exciting exploration targets lie below deep cover.



Primary and secondary high-grade gold mineralisation processes in orogenic systems: key to sustainable mining?

THE CHALLENGE

Zones of gold mineralisation can sometimes contain tiny and/or irregularly distributed veins of ultra high-grade gold. Where present, these high-grade intervals can significantly improve mine profitability, but current models of gold transport and deposition do not account for their formation. This leaves the presence and distribution of these zones unpredictable, posing a challenge for industry exploration and resource estimation.

Program 2 – Find More Viable Resources

STATUS: Completed.¹⁹

Project No: M10412

KEY FINDINGS

Discrete high-grade concentrations of gold accumulate where sustained fluid flow, rock deformation, and repeated remobilisation of gold coincide.

Localised ultra high-grade gold mineralisation develops as a consequence of multiple interacting chemical and physical processes.

These can include the development and mechanical transport of gold nanoparticles, deformation-induced electricity, and the influence of crystal defects and silica chemistry on the precipitation and remobilisation of gold within mineralised zones.

BENEFIT TO WA

Improved understanding of the formation and distribution of high-grade gold mineralisation will help the WA gold industry improve the quality and accuracy of resource estimation, reducing the footprint and improving the profitability of future mines.

Lead Organisation

University of Western Australia

Research Contact

Nicolas Thebaud

Sponsors

The Australian Research Council

Fosterville Gold Mine Pty Ltd

Karora Resources Pty Ltd

Newmont Australia Pty Ltd

Northern Star Resources Ltd

Monash University

University of Western Australia

Total Research Value

\$1,942,114

MRIWA Contribution

\$450,417

DOI

10.71342/232918258291

¹⁹ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/primary-and-secondary-high-grade-gold-mineralisation-processes-in-orogenic-systems-key-to-a-sustainable-mining/>

Evolution of Proterozoic multistage rift basins – key to mineral systems

THE CHALLENGE

The long-lived sedimentary basins of the North Australian Craton are increasingly recognised as important hosts for major metal deposits – particularly copper and gold – but understanding of the processes governing metal mobilisation and mineralisation during basin fill and subsequent tectono-thermal events affecting this region is incomplete.

Program 2 – Find more viable resources

STATUS: Completed²⁰

Project No: M0554

KEY FINDINGS

The North Australian Craton formed through multiple stages, with long-lived crustal structures controlling basin geometry, faulting, and mineralisation.

Analogue and numerical models show regional Proterozoic basins evolved under elevated geothermal gradients, progressing from wide to narrow rifts, and with inherited structures strongly governing extension and inversion.

Integrated geophysical imaging reveals deep lithospheric corridors linked to major mineral belts across the region, providing a predictive framework for targeting concealed mineral systems.

BENEFIT TO WA

The enhanced understanding this study provides of the mineralisation history of Northern Australia's Proterozoic sedimentary basins will support greater confidence in mineral exploration planning across this emerging mineral province, supporting investment and increasing the probability of future mineral discoveries.

Lead Organisation

The University of Western Australia

Research Contact

Mark Jessell

Sponsors

Anglo American Exploration (Australia) Pty Ltd

Anglo American Plc

Australian Research Council

BHP Group Operations Pty Ltd

IGO Ltd

Monash University

Teck Australia Pty Ltd

Total Research Value

\$2,041,040

MRIWA Contribution

\$540,837

Report DOI

10.71342/573576910654

²⁰ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/evolution-of-proterozoic-multistage-rift-basins-key-to-mineral-systems/>

A multi-scale approach to controls on mineralisation in the Fraser Zone, Western Australia

THE CHALLENGE

Although hosting some of the most significant recent mineral discoveries in Western Australia, deformation and high-grade metamorphism have largely obscured the primary controls on mineralisation of this of the Fraser Zone in the State's south. This lack of understanding represents a significant challenge to exploration of the Fraser Zone, despite its high fundamental prospectivity.

Program 2 – Find more viable resources

STATUS: Completed²¹

Project No: M0470a

KEY FINDINGS

Integrated tectonic, geochemical, and regolith insights improve understanding of mineralisation. The fundamental geological framework of the Fraser Zone formed in a back arc setting ~1390 Ma, with variable crustal thickness and metamorphism representing key influences on primary mineralisation.

Ni–Cu–Co deposits are controlled by crustal assimilation and local sulfur mixing, with inefficient silicate–sulfide mixing locally limiting mineralisation. Weathering processes create distinctive Ni–Cu dispersion halos that can represent key exploration markers.

BENEFIT TO WA

The enhanced multi-scale understanding of the processes driving mineralisation in the Fraser Zone will support more effective exploration targeting and decision making in this frontier mineral province, helping to drive future economic discoveries.

Lead Organisation

Curtin University

Research Contact

Katy Evans

Sponsors

Curtin University

Department of Mines, Petroleum and Exploration (GSWA)

IGO Ltd

Legend Mining Ltd

Mark Gareth Creasy

Total Research Value

\$1,023,300

MRIWA Contribution

\$341,300

Report DOI

10.71342/299587366637

²¹ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/a-multi-scale-approach-to-controls-on-mineralization-in-the-fraser-zone-western-australia/>

Machine-Assisted Granite Mapping in the Archaean Yilgarn Craton

THE CHALLENGE

Much of the Yilgarn's remaining mineral potential lies beneath cover, where exploration is costly and high-risk. Traditional mapping methods are subjective and limited by surface data, creating a need for consistent, scalable approaches to accurately classify granites and target prospective mineral systems beneath cover.

Program 2 – Find more viable resources

STATUS: Completed²²

Project No: M10587

KEY FINDINGS

Machine learning can successfully combine large geophysical datasets to consistently map granites across the entire Yilgarn Craton. This process identified new geological patterns, refined existing boundaries, and revealed hidden greenstone belts beneath cover.

These results improve understanding of the region and highlight new areas with potential for gold, lithium and rare earth mineral exploration.

BENEFIT TO WA

By making the mapping of granite geology across the Yilgarn more objective and consistent, the outputs of this work will help geologists target mineral exploration more efficiently and with less risk. This increased efficiency will support new discoveries under cover, reduce unnecessary environmental disturbance, and strengthen Western Australia's position as a global leader in exploration technology.

Lead Organisation

RSC Global Pty Ltd

Research Contact

Yongjun Lu

Sponsors

Department of Mines, Petroleum and Exploration (GSWA)

SQM Australia Pty Ltd

Terrain Minerals

Total Research Value

\$255,000

MRIWA Contribution

\$85,000

Report DOI

10.71342/560531747294

²² <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/machine-assisted-granite-mapping-in-the-archaeon-yilgarn-craton/>

CuBAS - Structural and sedimentological reconstruction and fluid flow simulations for copper exploration in the Yeneena Basin – Paterson Orogen, WA

THE CHALLENGE	
Copper deposits in sedimentary basins can lie deep and often under thick cover, which makes their exploration difficult. Integrated multidisciplinary approaches are needed to help reduce the search space and overcome the limitations of traditional surface-based methods.	
Program 2 – Find more viable resources	
STATUS: Completed ²³	Project No: M10502
KEY FINDINGS	Lead Organisation
This project showcases an integrated workflow combining structural restoration, stratigraphic forward modelling, and fluid flow simulation to improve exploration for sedimentary-hosted copper in the Yeneena Basin (WA). The study identified Officer Basin evaporites as a likely brine source, with sub-basin architecture and permeability anisotropy controlling fluid migration. Thermal convection and blind faults were shown to be critical for mineralisation in the Broadhurst Formation. The approach enhances predictive targeting and is applicable to other sedimentary basins.	Commonwealth Scientific Industrial Research Organisation (CSIRO)
BENEFIT TO WA	Research Contact
This project enhances Western Australia’s global leadership in mineral exploration by developing advanced, integrated modelling tools that reduce exploration risk and cost. It supports more efficient discovery of copper resources critical to the clean energy transition, strengthening the state’s economic resilience and contribution to a low-carbon future.	Thomas Poulet
	Sponsors
	BHP Metals Exploration Pty Ltd Department of Mines, Petroleum and Exploration (GSWA)
	Total Research Value
	\$600,000
	MRIWA Contribution
	\$150,000
	Funding DOI
	10.71342/996392307336
	Report DOI
	10.71342/106693231035

²³ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/cubas-structural-and-sedimentological-reconstruction-and-fluid-flow-simulations-for-copper-exploration-in-the-yeneena-basin-paterson-orogen-wa/>

Characterisation of clay-hosted rare-earth element deposits in Australia

THE CHALLENGE

Rare Earths are at the heart of the mineral requirements for new low emission technologies from permanent magnets in wind turbines to new high efficiency electrical conductors and components in batteries. The rate of the discovery of clay hosted Rare Earth Elements (REE) deposits in Western Australia exceeds the industry knowledge base and ability to characterise these minerals. This has resulted in a lack of common practices and reporting of resources and the opportunity.

Program 2 – Find more viable resources

STATUS: Completed²⁴

Project No: M10500

KEY FINDINGS

The project aims to characterise samples from a comprehensive suite of Western Australian clay-hosted REE deposits to answer these questions.

- 1) What controls REE distribution in the weathering profile?
- 2) What portion of REE are ionically bound to clays versus present in refractory minerals?
- 3) What refractory mineral phases are present?
- 4) What controls spatial variation in the degree to which REE are ionically bound?

Collaboration and sponsorship from 10 high potential deposits will help answer these questions.

BENEFIT TO WA

A reliable supply of REE is crucial for the world to make the green energy transition. Demand for electric vehicles and energy storage, all requiring REEs, is forecast to increase 30-fold over the next 20 years; the wind energy industry is forecast to experience similar rapid growth.

However, the extraction of REE in Chinese clay-hosted deposits has caused severe environmental damage. In contrast, REEs sourced under WA's strict regulatory framework are guaranteed to meet strict environmental, social and governance (ESG) standards, allowing WA to compete worldwide.

The growth of the REE resources in WA will help knowledge in processing and extraction of a critical Western Australian development industry. If this project is successful, the study of extraction of these REE will be able to proceed.

Lead Organisation

RSC Global Pty Ltd

Research Contact

Nishka Piechocka

Sponsors

Auric Mining

Dreadnought Resources

Golden Mile Resources

Heavy Rare Earths Ltd

Mt Ridley Mines

MTM Critical Metals

Terrain Minerals

Voltaic Strategic Resources

Total Research Value

\$202,500

MRIWA Contribution

\$67,500

²⁴ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/characterisation-of-clay-hosted-rare-earth-element-deposits-in-western-australia/>

CRC/Research Centre Participation



The Cooperative Research Centre for Transformations in Mining Economies (CRC TiME), is a national, industry-led research collaboration established in 2020. It brings together mining companies, research organisations, governments and regional and community stakeholders to address the complex challenges associated with mine closure and relinquishment.

CRC TiME's mission is to enable sustainable post-mining transitions by developing the data, tools, technologies and partnerships required to support resilient economic, environmental and social outcomes. The program focuses on maximising the long-term value of mining regions through improved closure planning, rehabilitation, and post-mine land use.

During 2025-26, MRIWA supported three CRC TiME research projects. These projects contribute to advancing knowledge, capability and technology in mine closure and post-mine transition, with a focus on outcomes relevant to Western Australia's mining regions.

	Commenced operation:	2020
	Funding duration:	10 years
	Participants:	74 participants including leading mining and METS companies, regional development organisations, government and research partners
	Total Project Value:	\$130M comprised of: \$29.5M cash from the CRC Program \$30.5M cash from industry and research participants \$70M in-kind support
	MRIWA contribution: (M0558)	\$300,000 over 10 years Additional \$480,000 in project funding
	Projects supported by MRIWA	Mine Pit Lake Assessment and Management: A National Initiative to Support Mine Closure and Regional Opportunities (M10458) Improved Prediction, Remediation and Closure of Acid and Neutral Metalliferous Drainage (AMD/NMD) Sites (M10442)
	Projects Completed in Period	Algae-based technologies for improved environmental outcomes and sustainable post-mining futures (M10501)



Mineral Exploration Cooperative Research Centre (MinEx CRC) is developing more productive, safer and more environmentally-friendly technologies supporting the discovery and definition of mineral deposits, including coiled tubing drilling technology and new technologies for collecting and interpreting data while drilling. MRIWA is a participant in the MinEx CRC on behalf of the State government, supporting the delivery of projects addressing the specific exploration needs of Western Australia.

MinEx CRC is currently in its third and final phase of research activity, which is scheduled to conclude at the end of December 2027. MRIWA currently supports four projects in this third phase of CRC activity.

	Commenced operation:	2018
	Funding duration:	10 years
	Participants:	Over 40 partners from mining and METS companies, government, and research organisations
	Total Project Value:	\$218M comprised of: \$50M cash from the CRC Program \$42M cash industry and research participants \$52M non-staff in-kind \$74M staff in-kind
	MRIWA contribution: (M0509)	\$1M over 10 years Plus additional project contributions of \$658,436
	Current Projects supported by MRIWA	Drilling Optimisation - Phase 3: MinEx CRC Project 1 (M10582) Seismic in the Drilling Workflow - Phase 3: MinEx CRC Project 5 (M10554) Petrophysics for Mineral Discovery during Drilling - Phase 3: MinEx CRC Project 4 (M10553) Coiled Tubing Drilling for definition of Mineral Deposits - Phase 3: MinEx CRC Project 2 (M10552)
	Projects Completed in Period	Seismic in the Drilling Workflow - Phase 2: MinEx CRC Project 5 ²⁵ Petrophysics for Mineral Discovery during Drilling - Phase 2: MinEx CRC Project 4 ²⁶ Coiled Tubing Drilling for definition of Mineral Deposits - Phase 2: MinEx CRC Project 2 ²⁷

²⁵ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/seismic-in-the-drilling-workflow-phase-2-minex-crc-project-5/>

²⁶ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/petrophysics-for-mineral-discovery-during-drilling-phase-2-minex-crc-project-4/>

²⁷ <https://www.mriwa.wa.gov.au/research-projects/project-portfolio/coiled-tubing-drilling-for-definition-of-mineral-deposits-phase-2-minex-crc-project-2/>



Heavy Industry Low-carbon Transition Cooperative Research Centre (HILT CRC) will enable Australia's heavy industry sector to compete in the low-carbon global economy for carbon-neutral materials such as 'green' iron, alumina, cement and other processed minerals. The Australian heavy industries sector will benefit substantially from a carefully considered mix of electrification and hydrogen-based fuels.

HILT CRC has continued with project and outcome delivery in line with its 2023-2027 research focus areas. In 2025 a total of 24 projects were active while 26 projects had been completed. Four (4) new projects were supported by allocation of MRIWA funds in 2025 bringing the total MRIWA drawdown projects to 10, including direct investment to support the stage two ARENA project for the beneficiation of fines to direct reduced iron (DRI grade using brines.

	Commenced operation:	2021
	Funding duration:	10 years
	Participants:	Partners from mining and METS companies, government, and research organisations
	Total Project Value:	\$176M comprised of: \$39M cash from Department of Industry, Science and Resources \$43M cash industry and research participants \$54M non-staff in-kind \$55M staff in-kind
	MRIWA contribution: (M10425)	\$1M over 10 years. ²⁸ Additional \$500,000 in direct project funding by MRIWA
	Projects supported by MRIWA	Hydromet beneficiation of iron ore using brines implementation (ARENA Funding) (M10522) Derisking of electric smelting furnaces for Australian Ores (M10563) Alumina refineries "Next Generation Transition" (ALUMINEX) project (M10591) Optimal fast start pathways to Green Steel via Magnetite (M10605) Australian intermediate product exports in a decarbonised global steel making industry-Phase 2 (M10629) Upscaling of novel green thermally assisted beneficiation pathways and impact of beneficiation on DRI and pellet production (M10636)
	Projects Completed in Period	Green beneficiation pathways (M10497) The upgrading of Iron Ore for DRI production using products from seawater RO Brines (M10504) Intermediate product exports for Australia-China green steel (M10505) Analysis of market cost and location factors for green iron and steel in Australia (M10506)

²⁸ Funding provided in full by the Department of Energy and Economic Diversification and managed by MRIWA.



The ARC Training Centre in Critical Resources for the Future (CCRF) brings together four of Australia's leading universities to deliver applied research and postgraduate training to secure Australia's future critical resource needs.

Supported by a consortium of industry sponsors together with state and federal government funding under the ARC Industrial Transformation Training Centre program, the CCRF is working to address real industry challenges in the critical minerals sector, supporting the free exchange of researchers, students, trainees and mentors – along with the knowledge they carry – across participating academic institutions and industry partners.

The work of the CCRF will generate new knowledge and understanding to enable the detection of mineralised systems through cover with unprecedented accuracy and precision, and improve understanding of the behaviour of critical ore minerals and controls on their distribution – both in the formation of economic ore systems in nature, and in industrial processing to liberate and purify value metals.

	Commenced operation:	2024
	Funding duration:	5 years
	Participants:	Consortium of 25 partners from mining and METS companies, government, and research organisations
	Total Project Value:	\$10.5M comprised of: \$5.0M from the Australian Research Council \$5.5M from industry and research participants
	MRIWA contribution: (M10479)	\$696k over 5 years

Facilities

Cathode Precursor Production Pilot Plant

The Cathode Precursor Production Pilot Plant (C4P) is a partnership between Curtin University, CSIRO, and the Minerals Research Institute of Western Australia.

Formerly funded by the Future Battery Industries Cooperative Research Centre (FBI CRC) and its partners, the C4P operates as a pilot plant to facilitate adoption, commercialisation and dissemination of precursor cathode active material (pCAM) production. During the current funding period, opportunities were identified to simplify processing, reduce costs, and lower environmental impacts across the battery materials supply chain. Local capabilities for producing alternative battery chemistries and conducting computational fluid dynamics (CFD) modelling of the process were also demonstrated, and the automation of analytical workflows was initiated. Overall, the C4P contributes to the development of high performance, cost effective and environmentally sustainable materials for energy storage applications.

The C4P has been pivotal in demonstrating that the battery and critical minerals industry in Western Australia is able to move beyond “dig and ship” mining.

	Commenced operation:	2024
	Funding duration:	1 year and 3 months
	Participants:	Curtin University CSIRO
	Total Project Value:	\$1.5M comprised of:
	MRIWA contribution: (M01569)	\$1.5M

Critical Minerals Advanced Processing Common User Facility

A feasibility and detailed business case study is being conducted to investigate the possible establishment of a circa \$200M Critical Minerals Advanced Processing common user facility (CMAP) in Western Australia, to support the development of the State's critical minerals processing industry and contribute to national objectives for increasing onshore value-adding and supply chain resilience. This study is co-funded by the Western Australian and the Federal Government, via the Critical Minerals National Productivity Initiative (CMNPI).

The study aims to determine CMAP's technical, commercial, financial and strategic viability. The investigation further aims to identify industry demand for common user pilot and demonstration-scale processing infrastructure, assess potential facility location(s), operating model(s), the types of equipment and services required to support critical minerals processing activities, commercial sustainability, circular economy and environmental considerations, and potential economic benefits for Western Australia and Australia more broadly.

The findings will inform a future government investment decision regarding CMAP.

	Study commenced:	2026
	Funding duration:	1 year
	Participants:	Department of Industry, Science and Resources (DISR)
	Total Project Value:	\$3.0M
	MRIWA contribution: (M10626)	\$1.5M

PROGRAMS

METS Innovation Program

Problem

Western Australia's mining sector faces increasing pressure to improve productivity, safety, sustainability and resource recovery while maintaining its position as a globally competitive resources jurisdiction.

The Mining Equipment, Technology and Services (METS) sector is critical to meeting these challenges by transforming research and new knowledge into practical technologies that can be deployed across mining operations. However, the commercialisation and adoption of emerging technologies often require targeted support, industry collaboration and access to development pathways.

Objective

In 2025–26, MRIWA strengthened its support for industry-led innovation by evolving the METS Focus Area into the dedicated *METS Innovation Program*. The program provides matched funding, project facilitation and collaboration support to accelerate the development, validation and commercialisation of innovative products and services by Western Australian METS companies. The program is aligned with MRIWA's strategic research priorities, including critical minerals, net-zero emission mining, exploration amplification, precision and low-impact mining, green steel, and alternative use of tailings and waste.

2025–26 Achievements

A key achievement during the year was the successful implementation of the METS Innovation Program, providing a dedicated mechanism to accelerate innovation, strengthen industry-research collaboration and support the commercialisation of WA-developed mining technologies.

During 2025–26, the program supported a diverse portfolio of industry-led projects spanning automation, exploration, mine decarbonisation, critical minerals, resource recovery and advanced data analytics, including:

- M10529 – Automated Flange Bolting Robot with Camera Vision for Mining and Minerals Processing Infrastructure (Total Marine Technology)
- M10532 – Drone-Deployed Transient Electromagnetic (TEM) System for Exploration and Mining Applications (Loupe Geophysics Pty Ltd)
- M10536 – *Raptor Grav*™: A Next-Generation Airborne Gravimeter (CMG Operations Pty Ltd)

- M10545 – Collar Keeper® System (CKS) Automation Phase (Aquirian Limited)
- M10583 – Critical Minerals Recovery with Simultaneous Generation of Cleaned Groundwater in the Goldfields (EcoTechnol Pty Ltd)
- M10585 – Development and Implementation of CMAP: A Corrosion Monitoring and Protection System for Gold Cyanidation Tanks (TECHT)
- M10623 – Establishing an Australian Rubidium Industry: Extraction and Purification from Pegmatite Ore (Everest Metals Corporation Ltd)
- M10625 – Advancing Low-Carbon High-Grade Silicon Production from Iron Ore Waste – Phase 1 (Element Zero)
- M10633 – Field-Scale Validation of Electrokinetic In-Situ Recovery of Metals from Tailings Waste (Ekion Pty Ltd)
- M10644 – Data Visualisation and Machine Learning for Truck Performance Prediction and Analysis (Electric Power Conversions Australia)
- M10646 – AI-Enhanced Machine Vision System for the Automated Flange Bolting Robot 'Boltron' (Total Marine Technology)
- M10660 – OptiClino Precision Drill Alignment System: MVP Optimisation, Prototype 2 Development and Underground Field Validation at Fimiston Underground Mine (IBT Robotic Systems Group)

The program also celebrated the completion of two projects:

- M10550 – Cooling System for Retrofitted Electric Mining Truck (EPCA-E100 Project) (Electric Power Conversions Australia)
- M10549 – Big Roller™ Energy-Efficient Overland Conveyor Development (Big Roller™ Overland Conveyor Company)

Collectively, these projects advanced technologies in automation, robotics, electrification, energy efficiency, exploration, critical minerals recovery, circular economy solutions and digital analytics.

The Program directly supported Western Australian Government priorities to foster innovation, accelerate decarbonisation, strengthen sovereign capability in critical minerals and enhance the global competitiveness of the State's mining and METS sectors.

Education & Workforce Development Program

The Education & Workforce Development Program, formerly known as the Education Program, underwent a review to see if it was fit for purpose. This review encompassed understanding the Program's stakeholders' needs. It identified internal and external drivers, including a marked decrease in enrolments in mining-related disciplines in Australian universities, as well as low awareness of mining careers. It also took into consideration broader state government policies. As a result, the Program expanded its scope to include workforce development.

Endorsed by the MRIWA Board in December 2025, the Program's scope includes workforce development issues for the WA research workforce. Its vision drives the growth of a highly skilled, diverse, and future-ready workforce to meet the evolving needs of Western Australia's minerals sector.

Through excellence in research, and industry collaboration, the Program promotes lifelong learning, supports diverse career pathways, and enables workforce transformation that fosters innovation, sustainability, and inclusive social and economic development across the State.

Over the year the Program delivered a variety of workshops to enhance the skills of our scholarship recipients, student interns, and scholarship and PD Bursary alumni, including but not limited to:

- Intellectual Property Essentials training
- Why do we need minerals research? (presentation for high school students)
- Aboriginal cultural competency training
- Project Management Fundamentals through AIM WA
- Entrepreneurial Mindset through the Centre for Entrepreneurial Research & Innovation

The Program continues to support sponsorship of the work of Australian Earth Science Education (formerly Earth Science Western Australia) supporting earth science teaching in Kalgoorlie schools.



MRIWA PhD Scholarships

The Program supports the development of exceptional talent to help meet the future needs of the Western Australian mining industry through:

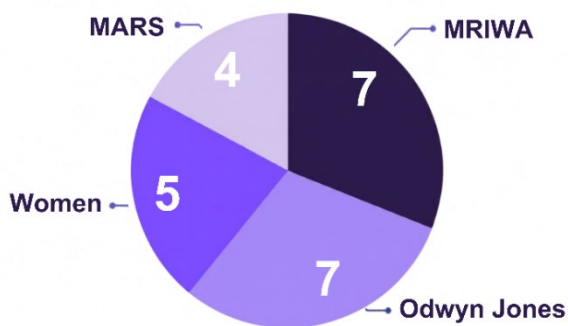
- A minimum of three prestigious MRIWA scholarships available each year to support post-graduate research students at Western Australian universities.
- Outreach and mentoring of PhD students during their studies.
- Administration of PhD scholarships awarded under the WA Government MARS (Mental Awareness, Respect and Safety) Program.
- Ongoing access to Program events and workshops after graduation.

Other activities in the Program

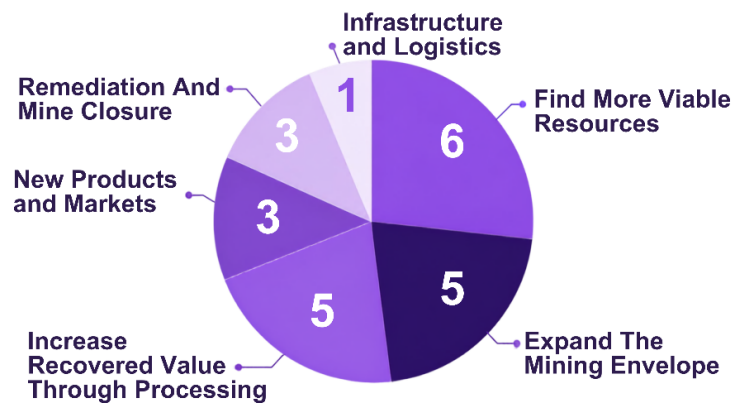
The Program has increased its impact through delivering the following:

- Greater inclusivity in workshop participation: Extending Program workshops and events to Higher Degree by Research students attached to MRIWA-funded research projects.
- Light-touch mentoring with Research Portfolio Managers: PhD scholarship recipients and student interns connected with MRIWA focus area leads. Run in a group setting, the sessions are an opportunity for students to seek advice, discuss research progress and share challenges with peers in similar research disciplines, and guided by the RPM.

Scholarship Type



Program



2026 MRIWA Scholarship Recipients

MRIWA PhD Scholarships

MRIWA PhD Scholarships are awarded through a competitive application process to students undertaking research aligned to MRIWA's Research Priority Plan at any university in Western Australia. One or more MRIWA PhD Scholarships may be awarded annually at the discretion of the MRIWA CEO, within the funds allocated by the MRIWA Board.

Current recipients

Project No	Scholarship Recipient	Project Title	Host University	Duration (yrs)	About Project
M10487	Nilan Jayasiri Mudiyansele	Accelerating Consolidation of Mine Tailings using Electro-osmosis Dewatering Technology	University of Western Australia	3.5	Improving tailings stability and safety using electro-osmosis dewatering, reducing failure risks and environmental impacts. It enables more efficient mine closure while supporting scalable, cost-effective practices across WA's mining industry.
M10542	Sistine Sun	The Unintended Effects of Carbon Emission Policy: International Evidence from the Paris Agreement and its Impact on the WA Mining Sector	University of Western Australia	2.5	The project shows how carbon costs may drive tax avoidance in mining, risking government revenue and sustainability outcomes. It informs policy to balance industry performance with long-term economic, environmental, and social benefits in WA.
M10544	Muzammil Khan	Towards decarbonisation in steelmaking: Grey-box modelling for optimisation of green and sustainable metallurgical coke production from biomass	Murdoch University	3.5	Supporting low-emission steelmaking by replacing traditional inputs with biocoke, significantly reducing GHG emissions and advancing WA's net-zero goals. It also drives economic growth and positions WA as a leader in sustainable steel production.
M10614	Farid Ullah	Advanced Integration of Electromagnetic Data in the Tomofast-x Inversion Code for Enhanced Mineral Exploration	University of Western Australia	4	Enhancing mineral discovery through more accurate, efficient geophysical techniques, reducing costs and environmental impact. It strengthens WA's competitiveness and supports sustainable growth in critical mineral supply.

Project No	Scholarship Recipient	Project Title	Host University	Duration (yrs)	About
M10675	Lisa Vella	Controls on the orderly distribution of giant deposits in self-organised mineral systems: new predictive criteria and analytical tools	University of Western Australia	3.5	Improves mineral discovery success in Western Australia, delivering strong economic benefits through more effective exploration.
M10676	Davood Hassanian Moghaddam	Green and Eco-friendly Membrane Technology for Sustainable Wastewater Treatment in Australia	Edith Cowan University	3.5	Enabling on-site wastewater treatment at mining sites, reducing freshwater use, costs, and environmental impact while supporting water recovery. It also enables critical mineral recovery and strengthens adaptive, sustainable water management.
M10678	Jonathan Michael Stokes	Unveiling the Critical Resource Potential of Western Australia's (WA) Proterozoic Carbonatites	University of Western Australia	3.5	Driving economic, environmental and social benefits by enabling sustainable exploration and development of critical minerals in WA. It will strengthen WA's role in the global energy transition while supporting workforce growth and responsible resource use.
M10679	Adeel Iqbal	Sustainable Enhancement of Asphalt Performance Using Biochar, Waste Plastic Aggregate, and Mining Waste	Edith Cowan University	1.8	This project reduces lithium industry waste and disposal costs while supporting cheaper, longer-lasting roads, advances circular economy and net-zero goals by repurposing major waste streams, and strengthens the critical minerals sector through local expertise development and job support.

MRIWA PhD Scholarships for Women

The MRIWA PhD Scholarships for Women is awarded annually. It was first awarded in 2018 and aims to promote opportunities for women in higher-degree research in the minerals sector.

Current recipients

Project No	Scholarship Recipient	Project Title	Host University	Duration (yrs)	About
M10452	Bishenka Mahaulpatha	Feasibility of effective metal recovery from tailings material via electrokinetic in-situ leaching	University of Western Australia	3.5	Enabling in-situ recovery of valuable metals from tailings, unlocking economic value while reducing environmental impact. It also improves tailings stability, lowering long-term risks and liabilities for industry and the state.
M10485	Hyunjin Na	Development of cementation-magnetic separation method for sulfide mineral processing and AMD prevention	Curtin University	3.3	This research introduces a simpler, flexible method to improve sulphide mineral recovery while reducing processing costs. It also reduces environmental risks by improving tailings management and preventing contamination.
M10613	Yasamin Hamidian	Development of a Gas-Assisted Ion-Selective Membrane for Lithium-Ion Extraction from Tailings	Edith Cowan University	2.9	Enabling low-emission, cost-effective lithium recovery from tailings, reducing waste and improving resource efficiency. It strengthens WA's competitiveness while supporting jobs, investment, and sustainable industry growth.

MRIWA Odwyn Jones PhD Scholarships

The MRIWA Odwyn Jones PhD Scholarships is awarded annually. This prestigious scholarship is named for Emeritus Professor Odwyn Jones AO, in recognition of his outstanding contribution to education in support of the mining industry in Western Australia.

Current recipients

Project No	Scholarship Recipient	Project Title	Host University	Duration (yrs)	About
M0548	Xingjie Chen	Investigating the utilisation of mine waste in shotcrete for underground support	University of Western Australia	4	This project converts waste rock into safe, durable materials for mine support, reducing costs and improving safety. It also lowers environmental impact by minimising waste and reducing contamination risks.
M0561	John Grigson	Giant rare-metal pegmatites of the East Pilbara Terrane, Western Australia: Mineral systems analysis and terrane-scale exploration	University of Western Australia	3.5	Improving targeting of lithium-rich pegmatites, enabling more efficient discovery of new deposits in WA. It supports future mineral supply and strengthens the long-term sustainability of the mining industry.
M10453	Kylie Blackwell	Beneficiation of Gold Telluride Ores	Curtin University	2.8	Supporting tellurium recovery from WA ores, strengthening its role in global clean energy supply. It also increases economic returns and jobs by unlocking additional value from existing mining operations.
M10484	Alex Eves	Petrogenesis and metallogenic significance of the Speewah Ti-V Deposit	University of Western Australia	2.9	Unlocking the mineral potential of the under-explored Kimberley region, enabling discovery of world-class deposits. It supports long-term regional economic growth, jobs, and royalties to replace lost income from the Argyle mine.
M10611	Kenneth Akiti	Responsible management of retired mining vehicle batteries to address environmental and economic challenges	Edith Cowan University	2	Delivering economic, environmental and social benefits by enabling the reuse of mining batteries, reducing costs and waste. It will also support renewable energy uptake and improve energy security in remote communities.

MARS Program PhD Scholarships

The MARS Program PhD Scholarships is awarded annually. As part of this program, Department of Local Government, Industry Regulation and Safety (LGIRS) is funding the creation of PhD Scholarships to attract and develop leading research talent in Western Australia. Administered by MRIWA.

Current recipients

Project No	Scholarship Recipient	Project Title	Host University	Duration (yrs)	About
M10594	Neil James	Psychological Capital – The Last Line of Defence in Psychosocial Safety in the Mining Industry	Edith Cowan University	6.7	Improving psychosocial safety in the WA mining industry can reduce distress, absenteeism, and costs while boosting productivity and wellbeing. This research identifies practical interventions that strengthen both workforce outcomes and industry performance.
M10596	Ben Walsh	Occupational Hygiene Dust Sampler Comparison Study in Western Australian Mining Operations	Edith Cowan University	4.5	Enabling more accurate and cost-efficient exposure monitoring through validated real-time technologies and improved industry standards. It supports better worker health outcomes while reducing compliance and sampling costs for the mining industry.
M10597	Nousheen Fatima	The Critical Impacts of Psychosocial Risk Factors on Workers' Behaviours and Workforce Sustainability: Examining the Role of Psychosocial Safety Climate in Mining Industry	Edith Cowan University	3.5	The project improves psychosocial safety in mining, reducing mental health risks while enhancing productivity, retention, and cost efficiency. It strengthens the sector's resilience and sustainability, supporting its ongoing economic contribution to Western Australia.

2025 - 2026 Completed MRIWA PhD Scholarships

Project No	Scholarship Recipient	Project Title	Host University	Duration (yrs)	About
M10486	Daniel Goldstein	Ore Body Characterisation using Machine Learning and Measure-While-Drilling Data	Curtin University	2.8	Low-cost drilling data enables real-time orebody insights, improving planning while reducing reliance on costly exploration. It delivers safer, lower-cost operations with less waste and higher productivity for WA's iron ore industry.
M10540	Emad Al-Hemyari	Data Processing and Inversion for Seismic While Drilling and Mining Using Distributed Acoustic Sensing and Machine Learning	Curtin University	2.5	Declining discoveries and rising demand create a major opportunity for WA, and this research enables efficient, low-impact exploration. It reduces drilling, preserves resources, redirects investment to sustainable methods, and builds workforce capability.
M10541	Yamini Kannappan	Extraction of Rare Earth Elements (REE) from Sub-economic Ores and Process Tailings	Curtin University	1.5	REE demand will outstrip supply by 2030, and this research unlocks WA's low-grade deposits to drive jobs, exports, and global competitiveness. Using green chemistry and circular economy approaches, it increases sustainable supply while minimising environmental impact.
M10562	Michael Ajith	Impact of COVID-19 on the leadership of operational leaders in the oil, gas, and mining sector of Australia.	Edith Cowan University	4.5	Embedding psychosocial safety and adaptive crisis leadership strengthens resilience, reduces risk, and protects FIFO workforce wellbeing. Digital innovation and proactive wellbeing strategies enhance environmental performance, workforce stability, and long-term sustainability.
M10595	Patrick Benetti	Effective Leader Safety Storytelling: its attributes and outcomes	University of Western Australia	1	Storytelling improves worker safety outcomes through psychological influence. It also enhances leadership perception by linking storytelling techniques to trust, engagement, and behaviour change.

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