Minerals Research Institute of Western Australia

Annual Report
2019-2020

mriwa
Minerals Research Institute
of Western Australia

Statement of Compliance

For year ended 30 June 2020

HON BILL JOHNSTON MLA
Minister for Mines and Petroleum

In accordance with section 63 of the *Financial Management Act 2006* (WA), we hereby submit for your information and presentation to Parliament, the Annual Report of the Minerals Research Institute of Western Australia (MRIWA or the Institute) for the reporting period ended 30 June 2020.

The Annual Report has been prepared in accordance with the provisions of the *Financial Management Act 2006* (WA) and any other relevant written law.

The financial statements comply with Australian Accounting Standards – Reduced Disclosure Requirements issued by the Australian Accounting Standards Board.

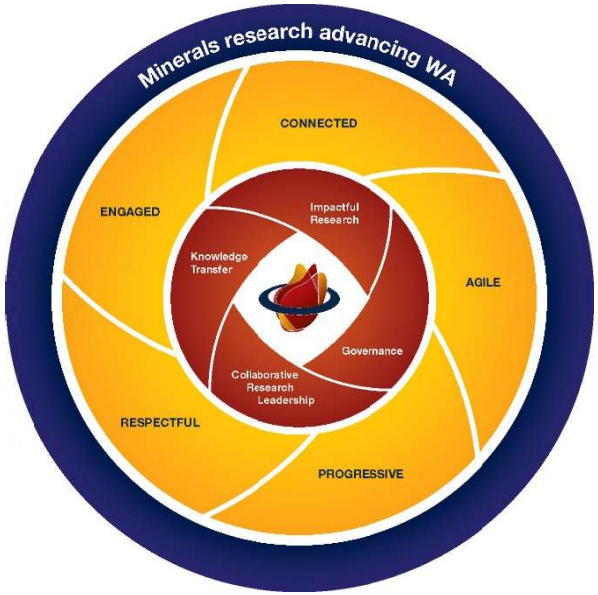
Miriam Stanborough
Chairperson of the Board

Date: 26 August 2020

Helen Cook
Deputy Chairperson of the Board

Date: 26 August 2020

Vision and Values



Goals

Impactful Research	Applied research creates capability and delivers economic and social benefit for Western Australia
Collaborative Research Leadership	Industry, academic and government relationships activate innovation and research networks attracting investment in high value activities
Knowledge Transfer	MRIWA is well-known and its minerals research outcomes are implemented
Governance	Robust governance and contemporary fit-for-purpose corporate practices

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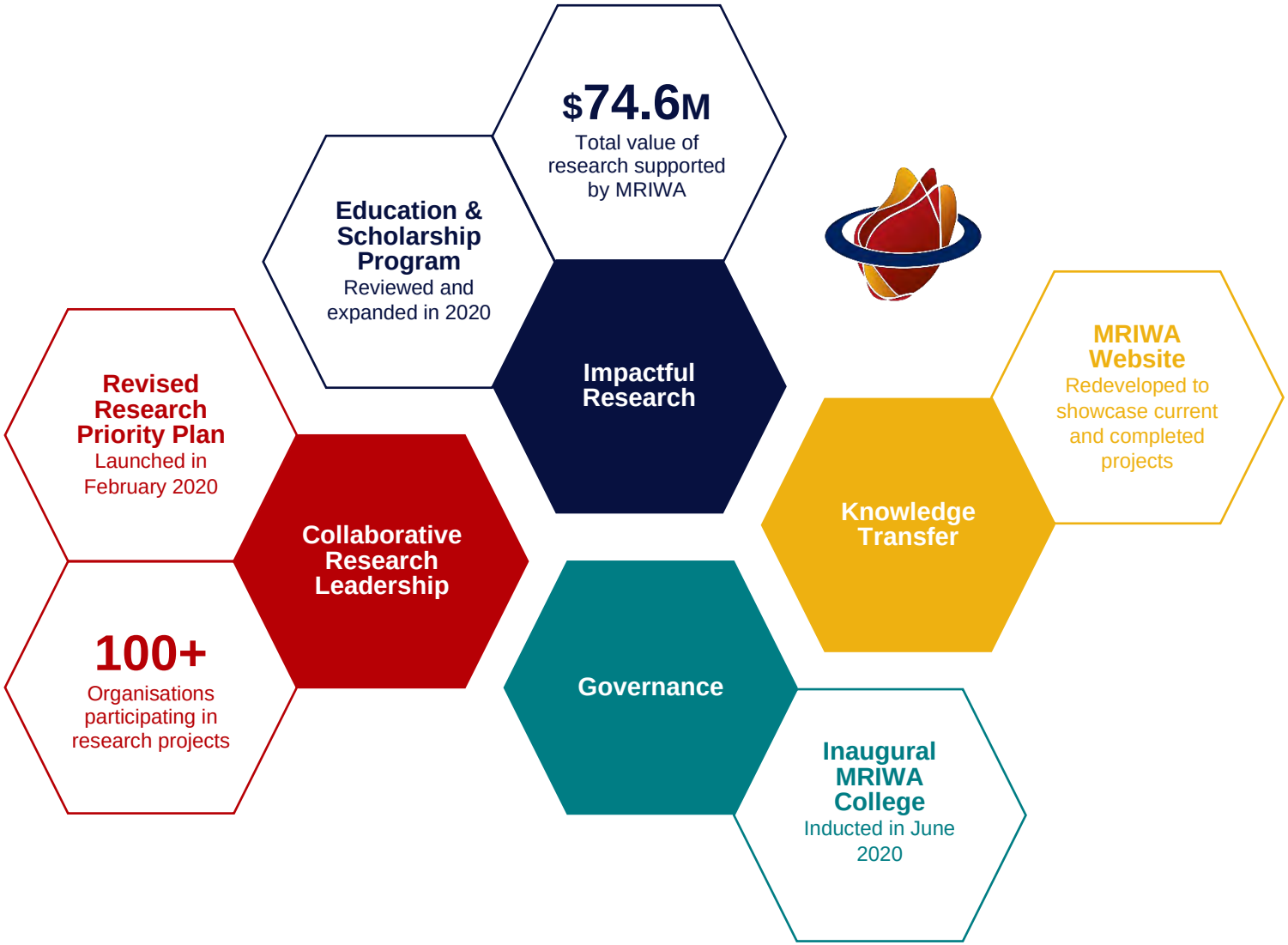
Overview

This section provides an overview of the Minerals Research Institute of Western Australia (MRIWA or the Institute), our vision and values and the broader MRIWA team who work to deliver on our strategic plan.

Highlights


$74.6M
Total value of research supported by MRIWA
Education & Scholarship Program
Reviewed and expanded in 2020
Impactful Research
Revised Research Priority Plan
Launched in February 2020
Collaborative Research Leadership
100+
Organisations participating in research projects
MRIWA Website
Redeveloped to showcase current and completed projects
Knowledge Transfer
Governance
Inaugural MRIWA College
Inducted in June 2020

Message from the Chair

Ms Miriam Stanborough

It was my privilege to assume the role of Chair of MRIWA in January 2020. I would like to acknowledge outgoing Chair, Denise Goldsworthy's tremendous leadership of the Institute since 2018 and her substantial contribution to the organisation as a Director since 2016. I also thank retiring Director, Jane Hammond, for her service to the MRIWA Board, and welcome new Directors, Hailey Adams-Packer and Linda Tompkins.

During the past year, the MRIWA Board approved new MRIWA investment of $3.8 million matched by cash support of third parties of $18.8 million.

As at the end of the reporting period, the total value of research supported by the Institute was $74.6 million, in addition to 13 directly funded PhD scholarships.

As highlighted in last year's annual report, an independent review of the *Minerals Research Institute of Western Australia Act 2013* (WA) recommended, among other things, the MRIWA Research Priority Plan be reviewed to ensure each of the research themes were still contemporary.

While historically the Institute has predominantly been a research grants agency, an update of our strategy and revision of our plan presented an exciting opportunity to refocus our activities.

Launched in February 2020, the MRIWA Research Priority Plan is built around four pillars: Impactful Research; Collaborative Research Leadership; Knowledge Transfer; and Governance.

In the area of **Impactful Research,** our goal is for applied research to create capability and deliver economic and social benefit for Western Australia.

Our second pillar, **Collaborative Research Leadership**, ensures we bring key people from industry and the research community together to ensure there is a common understanding of the issues facing our industry, the current state of play and what is needed to address these issues.

Our third pillar, **Knowledge Transfer**, is focused on how we can promote awareness of, and generate interest in, minerals research. Over the past year the Institute released a suite of research reports which were the culmination of years' worth of effort by our research partners. We also increased our profile through various channels of communication, including social media, to ensure that the key findings from MRIWA-sponsored research were widely disseminated and used by our industry.

During the year, MRIWA updated and streamlined our grant process to ensure we attract the highest quality research applications focussed on benefits to WA.

We also established the MRIWA College – an assembly of technical experts from the WA minerals industry who are leaders in their fields, to assess our grant applications and ensure they address the highest priority areas so the resulting value of MRIWA-sponsored minerals research is maximised.

Successful organisations are powered by great people who work collaboratively and enthusiastically to deliver outcomes. MRIWA is able to deliver substantial outcomes for WA because of the contribution of many great minds and willing hands.

To this end, I thank my fellow board members for their dedicated oversight and commitment to good governance; our outgoing advisory committee members and incoming College members for applying their technical expertise to ensure the research supported by MRIWA is well-designed and targeted to the needs of industry; our Minister, the Honourable Bill Johnston MLA, Minister for Mines and Petroleum, Energy and Industrial Relations for his championship of MRIWA's work to advance WA through minerals research; and of course our small but committed team of employees, led by CEO Nicole Roocke who has continued to drive improvements in MRIWA's efficiency, relevance and impact since joining us in 2018.

Miriam Stanborough
Chairperson of the MRIWA Board

Responsible Minister

Hon. Bill Johnston MLA, Minister for Mines and Petroleum.

About Us

The Minerals Research Institute of Western Australia (MRIWA or the Institute) is a statutory body established by the Western Australian Government in 2013 under the *Minerals Research Institute of Western Australia Act 2013* (WA) (the MRIWA Act).

Our Work

MRIWA fosters and promotes minerals research for the benefit of the State by:

- Undertaking, procuring or managing minerals research projects;
- Fostering academic activities;
- Conferring and collaborating on matters relating to minerals research;
- Maintaining current knowledge of minerals research;
- Promoting awareness of and fostering public interest in matters relating to minerals research; and
- Providing advice to the Minister.

Message from the CEO

I am immensely proud of what the MRIWA team have achieved this year, embracing every challenge which has come along and finding a way to turn it into an opportunity.

The last twelve months has been a period for us to implement our strategic plan and instil our values into everything we do.

Our vision is for minerals research to advance Western Australia. To do this we have embraced the values of being:

- *Connected*, focusing on proactively building effective relationships to enable cross-disciplinary collaboration within projects and across our research portfolio.
- *Engaged,* working closely with our stakeholders we have reviewed and released our revised Research Priority Plan and reviewed our grant administration and assessment process to ensure these enable us to achieve our vision. As a team we are invested in achieving successful outcomes for the state of Western Australia through the delivery of an impactful research program.
- *Respectful,* of what has gone before in the organisation and building on our strengths.
- *Progressive,* and advocating for the development and adoption of innovative solutions. COVID-19 quickly escalated the need for us to find new ways for us to do business and engage with our research partners and other stakeholders so we could still deliver on our commitments and obligations.
- *Agile*, and viewing every challenge as an opportunity for us to learn and be responsive to the need for change. Whether working from home, undertaking recruitment remotely or focusing on streamlining our processing while ensuring robust governance, there has really been no stone unturned in the organisation.

Key highlights include:

- Creation and initial appointments to the MRIWA College, a cluster of subject matter experts who will undertake our grant assessments and inform and provide us with a broader perspective on our research portfolio and how we can better deliver on our strategic plan.
- Working with the Perth-based Media on Mars to deliver a vastly improved website to provide us with a platform to showcase the significant investment by State government and other sponsors into minerals research.
- Leading an organisation which recognises the importance of diversity and the enhanced decision making which can result from this with us achieving gender diversity of:

  57% female MRIWA Board members;
  60% female MRIWA staff;
  47% female MRIWA College members.

Sixteen new research projects and two scholarships were approved by the MRIWA Board during this financial year for work to be undertaken across the mining value chain. Given the large investment in the Future Battery Industries CRC, a significant number of these projects seek to support Western Australia enhance its position in the global battery chain.

Significant Issues and Trends

Current and Emerging Issues and Trends

MRIWA's research program is highly regarded and funded through a combination of state government appropriation, federal government research grants and sponsorship from third parties.

Strategic changes in government policy, exposure to variations in economic conditions resulting from COVID-19 and decisions by other research grant bodies all influence the success and efficiency of this model. Maintaining key sponsor relationships is crucial to ensuring the continuity and momentum of key research programs.

Likely Developments & Forecast Results of Operations

In the upcoming period MRIWA will focus on proactively initiating conversations to determine those areas of minerals research where we can deliver maximum impact back to the State.

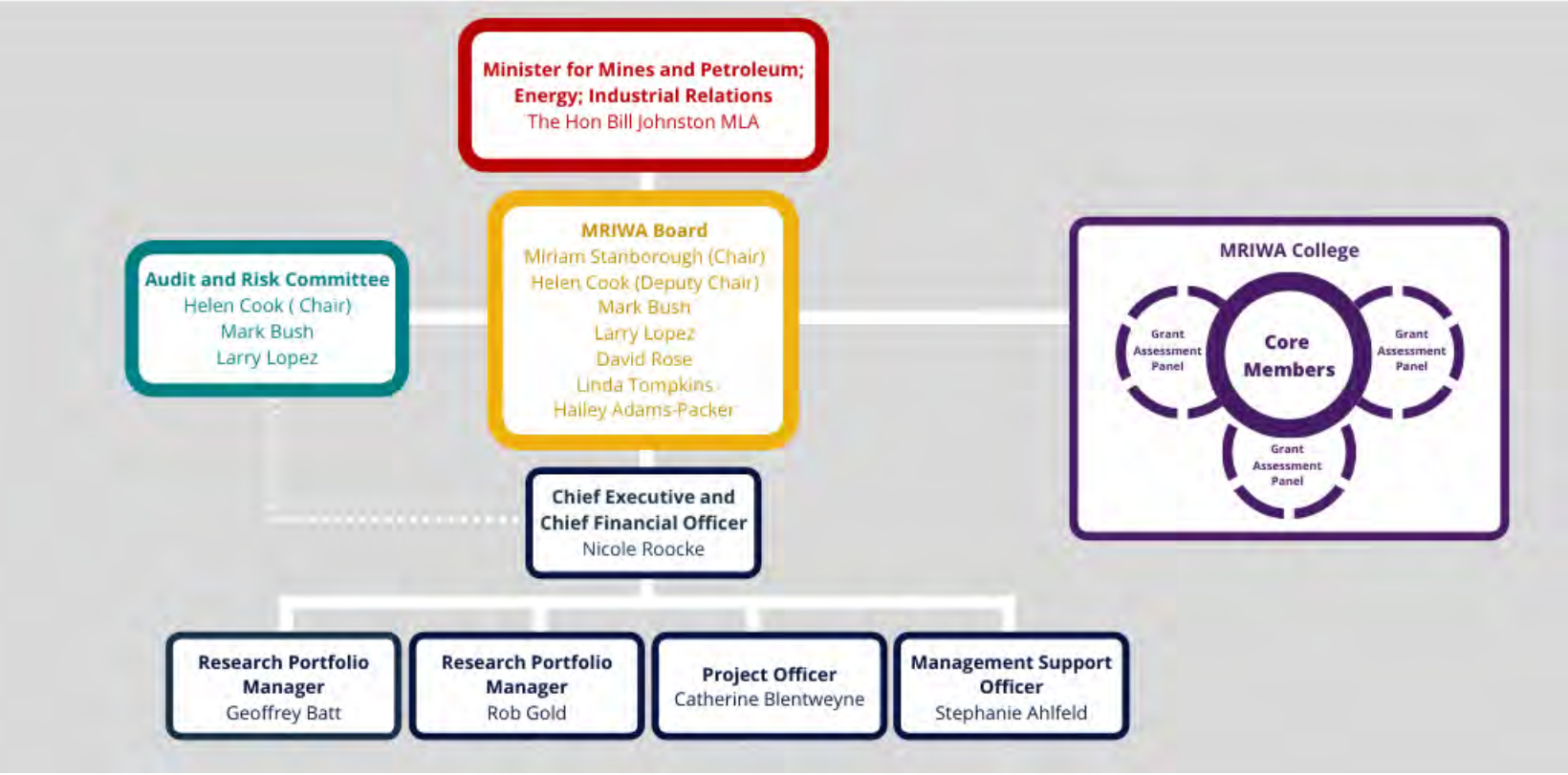
I would like to express my appreciation for the MRIWA team and the way they seek to find opportunities to embrace new technologies and grow the organisation above and beyond its current strong foundations with the limited resources we have.

I am thankful for the engagement of the MRIWA Board as it ensures there is robust decision making and breadth in consideration of issues.

I would also like to thank Minister Bill Johnston and his staff for their valued advice and support.

Nicole Roocke
Chief Executive Officer and Chief Financial Officer

Our Structure



Our Team

Ms Nicole Roocke, *Chief Executive Officer and Chief Financial Officer*
Appointed CEO in November 2018, Nicole joined MRIWA after spending 15 years at the Chamber of Minerals and Energy of Western Australia coordinating industry input on a variety of government regulatory and policy issues and facilitating collaboration within the resources sector.

Nicole holds a Master of Science in Industrial and Organisational Psychology from the University of Western Australia (UWA) and a Master of Risk Management from the University of New South Wales (UNSW).

Dr Geoffrey Batt, *Research Portfolio Manager*
Geoff joined the MRIWA team as a Research Portfolio Manager in December 2019, providing strategic advice and project management services for the Institute. He maintains a strong focus in enhancing the accessibility and transferability of research innovations in the applied mining sector and leads MRIWA's education and scholarship programs.

An experienced research scientist and manager, Geoff came to MRIWA from a private sector consulting role and has spent 20 years as a successful and respected researcher and educator at leading institutions around the globe.

He holds a PhD in Earth Science from the Australian National University (ANU), and an MBA from UWA.

Mr Rob Gold, *Research Portfolio Manager*
Rob joined MRIWA as Research Portfolio Manager in May 2020, bringing with him 25 years of experience in resource development, minerals exploration, capital project management and research and development across most metal commodities.

Rob holds a Master of Science in Mineral Exploration from Leicester University, an MBA from the University of Cape Town and a postgraduate certificate in Project Management.

Ms Stephanie Ahlfeld, *Management Support Officer*
Stephanie's career in the public service include roles in administration, finance and human resources within a Regional Local Authority. She commenced as the Institute's Management Support Officer at the end of 2015 with a focus on customer service, compliance and continuous process improvement.

Stephanie holds a Bachelor of Commerce (Accounting) from Curtin University.

Ms Catherine Blentweyne, *Project Officer*
Catherine joined MRIWA in September 2019. She has over 12 years' experience supporting research, across roles in libraries, administration and research development. She maintains a strong interest in the areas of scholarly communication and metrics-based evaluation of research quality and impact.

She holds a Master of Information Studies in Information Architecture from Charles Sturt University (CSU).

Our Board Members

Ms Miriam Stanborough became Chair of MRIWA in January 2020.

Miriam is a chemical engineer with 20 years' experience in the minerals processing industry, across commodities including copper, uranium, gold, silver, alumina and mineral sands. Miriam is currently Group Manager – Productivity & Innovation with Monadelphous.

Miriam has held roles in technical development, production management, project management, business improvement, HR & diversity strategy, and sales & marketing.

She holds degrees in Arts and Mineral Economics, is a member of the Australasian Institute of Mining and Metallurgy and is a graduate of the Australian Institute of Company Directors.

Miriam's other current board roles include: Chair of SHINE Inspire Achieve Belong Inc, Deputy Chair of the Northern Agricultural Catchments Council and Director of Scouts WA. She also sits on the Independent Assessment Committee for the Federal Government's Boosting Female Founders Initiative.

Ms Helen Cook has longstanding board experience across various sectors and has been Deputy Chair of the MRIWA Board since 2017 and Chairman of the Audit and Risk Committee since 2014.

As the National Partner in charge of KPMG's Energy and Natural Resources Group until 2014, she commenced Non-Executive Directorship roles with RAC Holdings, RAC Finance, RAC Insurance, the UWA Mining Energy and Natural Resources Law Advisory Board, the Finance and Governance Panel for the Australia Council, Councillor of the National Gallery of Australia, WA Councillor of the Australian Institute of Company Directors, and is a member of Chief Executive Women.

Helen's past board roles include Deputy Chair of Fremantle Ports, Chair of the Art Gallery of WA, Director of the Perth Theatre Trust and various roles in the resources and commercial sectors.

Ms Hailey Adams-Packer has considerable public policy experience having worked across a number of portfolios within Western Australia's public service. She has spent the last seven years within the mining and petroleum portfolio, recently taking on the role of General Manager Title Compliance and is well recognised for her leadership, strategic thinking and policy development.

Hailey is also the Managing Director of Pacmentality Consulting, a digital business support agency and brings a unique blend of experience in technology, business, organisation development and government relations.

Outside of the workplace, Hailey represents Western Australia in lawn bowls and actively gives back to her sport through her involvement as a member of BowlsWA Board's Club Development committee.

Professor Mark Bush has over 30 years of experience in research, research leadership, grant assessment and grant administration, while holding various academic and leadership positions with UWA.

Mark brings with him a broad knowledge of Engineering. He is currently Emeritus Professor with UWA and has served in the past as Head of Department of Mechanical and Materials Engineering; Dean of Faculty of Engineering, Computing and Mathematics; and Director of Animal Research Services.

He is an Honorary Fellow of Engineers Australia (Hon FIEAust), Chair of the National Engineering Accreditation Board and Chartered Professional Engineer (CPEng), and Fellow of the Academy of Technological Sciences of Engineering (FTSE), and has served in various leadership positions in both organisations.

Mr Larry Lopez is a Partner at Perth-based Australian Venture Consultants (AVC). Larry has over 35 years' experience financing innovative projects and companies including executive roles in government and corporate initiatives that enable the commercialisation of research outputs.

Larry obtained a BSc from Menlo College, School of Business Administration and is a graduate of the Pacific Coast Banking School at the University of Washington.

Larry is a non-executive director of several IT-related private companies and sits on not-for-profit boards including Fulbright Australia and the Centre for Entrepreneurial Research and Innovation.

Larry has been a director or partner in a number of venture capital funds and is currently a director of a venture capital fund investing in technology that enables the mining sector.

Mr David Rose is a Director in mining consulting with KPMG, with 35 years of diverse experience in the mining industry across gold, base metals, coal, diamonds and iron ore, in both open pit and underground. David's most recent executive roles were Chief Operating Officer, St Barbara Ltd, and Managing Director, Rio Tinto (Argyle Diamonds and Rio Tinto Iron Ore).

Consulting engagements have included expert panel reviews, operational improvement projects and management systems upgrade projects for mature operating mines. He has also undertaken operational readiness and systems design engagements for pre-start-up and transitional mines, in Australia and overseas.

David is a past Deputy Chairman and now Honorary Fellow of Leadership WA, a Fellow of the AusIMM, a Graduate of the AICD, President of Rowing WA and a Director of St Catherine's College (UWA).

Dr Linda Tompkins has over 35 years of global experience in the resource sector through professional roles as a research and exploration geologist, technical director of an ASX and AIM listed exploration company, corporate and resource lawyer, and group general counsel and company secretary of an ASX listed company with overseas mining interests.

Linda has on-site experience in Australia, Brazil, China, and Africa in exploration, development, and mining operations, for diamonds, lead-zinc, nickel, and gold.

Dr Tompkins has a PhD (Geology) and LLB (Hons) from UWA, and is a member of the Geological Society of Australia, and the Resources and Energy Law Association (AMPLA).

Linda's past board roles include director AMPLA national board, member of the advisory board of the UWA Geoscience Foundation, and other roles in the resources sector.

MRIWA Board

MRIWA Board members are appointed by the Minister for Mines and Petroleum, in accordance with Section 27(1) of the MRIWA Act and are remunerated by an annual fee set by the Public Sector Commissioner. The fee has not been varied since first established on 20 December 2013.

Membership as at 30 June 2020	Initial Appointment	Term Expiry	No. of Meetings Attended	Sitting fees ($)
Miriam Stanborough (Chair effective 1 January 2020)	1 Oct 2017	31 Dec 2022	6 of 6	17,048[(a)]
Helen Cook (Deputy Chair and Chair, Audit and Risk Committee)[(b)]	28 Jan 2014	31 Jan 2023	6 of 6	13,614
Hailey Adams-Packer	1 Feb 2020	31 Jan 2023	3 of 3	0[(c)]
Mark Bush[(b)]	1 Feb 2016	31 Dec 2021	5 of 6	11,405[(a)]
Larry Lopez[(b)]	1 Jan 2016	31 Dec 2021	5 of 6	11,405[(d)]
David Rose	1 Jun 2018	31 Jan 2021	5 of 6	11,405[(d)]
Linda Tompkins	1 Mar 2020	28 Feb 2023	2 of 2	2,815
Denise Goldsworthy (Chair until 31 December 2019)	*1 Feb 2016*	*31 Dec 2019*	*3 of 3*	*11,346*
Jane Hammond	*1 Oct 2017*	*31 Jan 2020*	*2 of 3*	*0[(c)]*

(a) Foregoes a portion of remuneration and donates back to the MRIWA Directors' Scholarship
(b) Audit and Risk Committee Member - the Committee assist the MRIWA Board by providing an objective review of the effectiveness of the financial management and reporting, risk management, audit and compliance framework. The Chief Financial Officer and Deloitte attend ex-officio
(c) Ineligible for renumeration in accordance with Premier's Circular 2010/02 State Government Boards and Committees
(d) Foregoes all remuneration and donates back to the MRIWA Directors' Scholarship

Legislation

Enabling and Administered Legislation

MRIWA was established as an agency in February 2014, under the *Minerals Research Institute of Western Australia Act 2013* (WA).

The Institute administers only the *Minerals Research Institute of Western Australia Act 2013* (WA).

Other Key Legislation Impacting on our Activities

In the performance of its functions, the Institute complies with other relevant written laws including the following Western Australian legislation:

- *Auditor General Act 2006*
- *Disability Services Act 1993*
- *Electoral Act 1907*
- *Equal Opportunity Act 1984*
- *Financial Management Act 2006*
- *Freedom of Information Act 1992*
- *Government Employees Superannuation Act 1987*
- *Industrial Relations Act 1979*
- *Interpretation Act 1984*
- *Library Board of Western Australia Act 1951*
- *Limitation Act 1935*
- *Minimum Conditions of Employment Act 1993*
- *Occupational Safety and Health Act 1984*
- *Public Interest Disclosure Act 2003*
- *Public Sector Management Act 1994*
- *Salaries and Allowances Act 1975*
- *State Records Act 2000*
- *State Supply Commission Act 1991*
- *Workers' Compensation and Injury Management Act 1981*

Report on Operations

Actual Results versus Budget Targets

	2020 Target $	2020 Actual $	Variation $
Total cost of services	10,550,013	7,743,992	2,806,021
Net cost of services	4,948,871	4,959,199	10,328
Total equity	8,964,832	10,018,704	1,053,872
Net increase / (decrease) in cash held	(734,583)	309,504	1,044,087
Approved salary expense level	780,775	728,632	64,997

For detailed information on MRIWA's financial performance, refer to the *Financial Statement and Notes* section of this report.

Summary of Key Performance Indicators

Key Effectiveness Indicator	2019-20 Target	2019-20 Actual
Ratio of total cash investments in research projects to total approved MRIWA cash investment in those research projects	*4*	14.51
Key Efficiency Indicator	**2019-20 Target**	**2019-20 Actual**
Total administration cost for the year as a percentage of the total cash value of research projects and the education program under management during the year	*4%*	2.01%

For detailed information on MRIWA's Key Performance Indicators, refer to the *Our Performance* section of this report.

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Our Projects

This section outlines our applied research projects, how we create capability and deliver economic and social benefit for Western Australia.

Through the MRIWA research portfolio, industry, academic and government relationships are activated enabling innovation and research networks to attract investment in high-value research activities.

Highlights

Minerals Research Advancing Western Australia

$74.6M Total value of research supported by MRIWA

$15.3M MRIWA's contribution

$22.6M Total value new projects approved in 2019-20

$59.3M Third parties' contribution

100+ Organisations participating in research projects

70 Current research projects

35 Individual research projects

16 New projects approved in 2019-20

18 Final Technical Reports published

13 Current PhD Scholarship recipients

2 New PhD Scholarships awarded in 2019-20

$1.2M Invested by MRIWA in PhD Scholarships

$7.6M Invested by MRIWA in CRCs

22 Approved CRC research projects

Research Priorities

The Minerals Research Institute of Western Australia (MRIWA) is focused on the research and development needs of the Western Australian minerals industry to ensure it remains an engine of economic growth for Western Australia.

MRIWA invests through competitive grants made to organisations within Australia and abroad that leverage multi-partner funding from industry and/or other government sources of funding.

The MRIWA Research Priority Plan (the Plan) identifies the key areas where investments will be made into high impact research and development. Those seeking to work with MRIWA on our **Impactful Research** program need to demonstrate alignment with the priorities outlined in the Plan and how their proposals deliver economic and social benefit for Western Australia.

The revised Research Priority Plan was released in February 2020 and describes the medium to long term knowledge and technology needs of the State's minerals industry.

Priorities included in the Plan are intended to be those issues which industry, the research sector and the MRIWA Board agree present real and significant challenges inhibiting Western Australians from benefiting from the minerals sector to its fullest extent; and where resolution of these will create opportunities and deliver value.

The priorities fall across six broad research areas (Program areas). The Program areas incorporate priorities specific to parts of the mining value chain, and broader themes applicable across the value chain, with an integrated approach required to achieve the intended outcomes outlined in the Plan.

Research Priority Plan Summary

Program Goals	Improve mineral exploration productivity through better detection, exploration technology and prediction performance. Inform pre-competitive geological, geochemical and geophysical knowledge base.	Advance knowledge and capability towards solutions for mining more ore from challenging deposits. Create engineering capability and demonstrate technical feasibility of mining more selectively and deeper.	Increase yield and throughput, optimise use of raw materials, create mineral processing capability and support activities associated with new processing technologies.	Optimise supply chain infrastructure by enabling enhanced networks and accurate geo-positioning. Decrease the capital and operating costs associated with getting commodities to market.	Create new industries and niche markets to increase demand for one or more minerals found in this State. Create opportunity for progressive downstream processing activity.	Develop new technologies and approaches for mine remediation and alternative land use, while filling knowledge gaps to ensure a sustainable positive legacy for the industry and surrounding communities.
Themes	• Mineral systems • Detection technology	• Deep & complex extraction systems • Engineering in highly stressed & complex rock masses • Mining technology	• Processing technology • Interoperability	• Communications & positioning technology	• Strategic foresight • Downstream processing technology	• Acid & mine drainage & treatment of tailings • Sustainable land use post-mining
	Data Driven Decisions;	Energy Utilisation;	Regulatory Tools & Processes;	Safety, Social and Environmental Sustainability;	Workforce of the Future	

Our Scholars

A key goal of MRIWA is for applied research to create capability and deliver economic and social benefit for Western Australia.

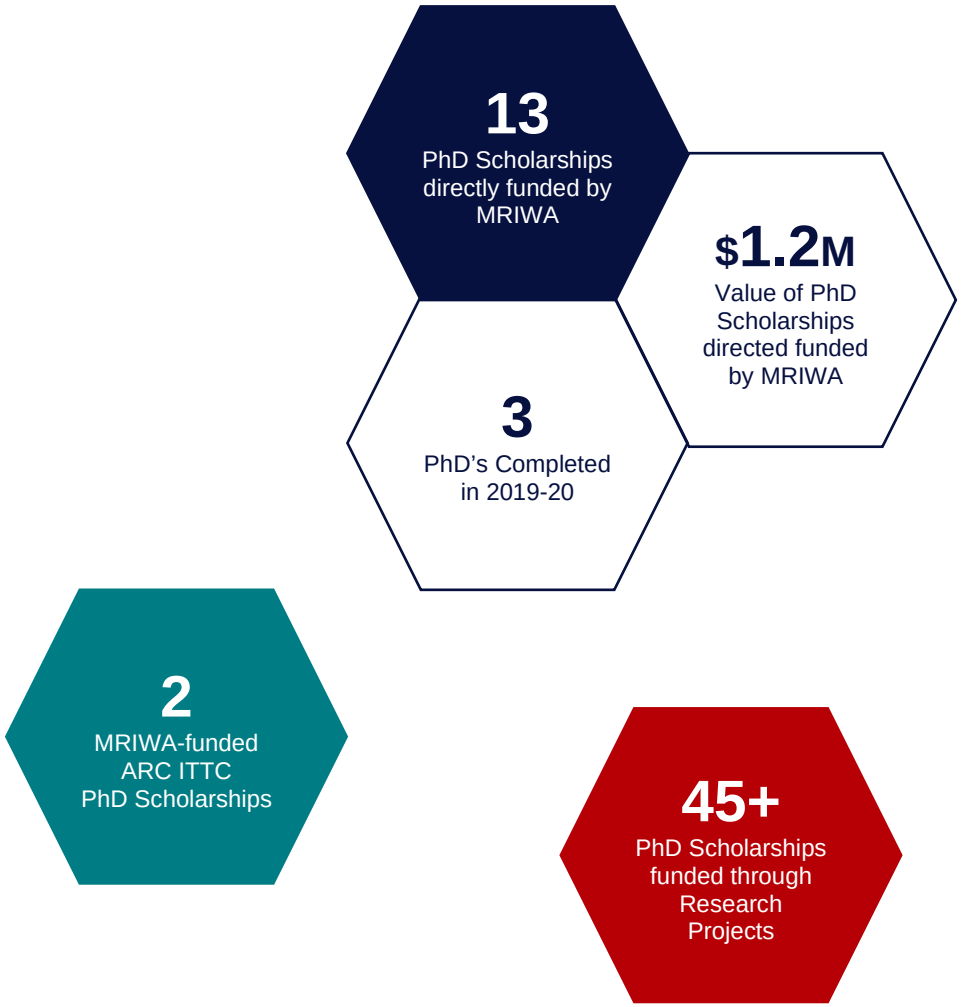
To do so, MRIWA invests in developing professionals prepared for the future workforce needs of the Western Australian minerals industry through a post-graduate scholarship program for higher-degree-by-research candidates.

On an annual basis, subject to availability of funds and receipt of suitable applications, MRIWA may award:

- 1 Directors' PhD Scholarship valued at no less than $40,000 annually
- 2 PhD research scholarships valued at no less than $35,000 annually
  - Odwyn Jones Scholarship
  - MRIWA Research Scholarship for Women

MRIWA also funds two students undertaking PhD research with the ARC Training Centre for Transforming Maintenance through Data Science and indirectly supports approximately a further 45 PhD students through scholarships funded under individual research projects summarised in the next section.

Scholarship Overview



2019-20 MRIWA Scholarship Recipients

Alicja Polewacz - Research Scholarship for Women

Project Title	Processes at the interface between fluids and lithium minerals	
Host University	Murdoch University	**MRIWA Contribution** $142,500 over 3.5 years
Project Number	M0563	
Status	Commenced	

A graduate of the Offenburg University of Applied Sciences in Germany and the University of Warmia and Mazury in Olsztyn, Poland, Alicja was awarded the 2020 MRIWA Research Scholarship for Women to undertake PhD studies at Murdoch University under the supervision of Dr Hans Oskierski.

Alicja's research is focused on investigating the mechanisms of replacement, leaching, and dissolution occurring at the interface between fluids and lithium minerals. Her work will inform improved methods for the extraction of lithium in mineral processing, as well as understanding of natural alteration and weathering of lithium minerals.

John Grigson - Odwyn Jones Scholarship

Project Title	Giant rare-metal pegmatite deposits of the East Pilbara Terrane, Western Australia: mineral systems analysis and criteria for terrane-scale exploration	
Host University	University of Western Australia	**MRIWA Contribution** $55,000 over 3 years*
Project Number	M0561	
Status	Commenced	

John holds a Bachelor of Science degree with first class honours in Geology from the University of Western Australia. He was awarded both the Ross Medal from the Geological Society of Australia and the Edward Sydney Simpson Prize in Geology from UWA for his undergraduate studies in 2018.

He received the 2020 Odwyn Jones PhD Scholarship as a top-up scholarship and will be using the award to investigate the giant rare-metal pegmatite deposits of the East Pilbara Terrane under the supervision of Professors Tony Kemp and Steffen Hagemann.

John's research will be directed towards generating a mineral systems-type model for the genesis of rare metal pegmatite deposits to aid exploration for these valuable mineral resources throughout the Pilbara and Yilgarn Cratons.

*Top-up stipend only

Directors' Scholarship

The Directors' PhD Scholarship is funded in part via the donation of sitting fees by Directors of the MRIWA Board. This scholarship is awarded at the discretion of the MRIWA Board and is not guaranteed to be offered every year. A total of four Directors' Scholarships have been awarded since 2014.

Current recipients

Project No	Scholarship Recipient	Project Title	Host University	Duration (yrs)	Status	MRIWA Contribution ($)
M0523	Keith Giglia	Monitoring and control of hydrocyclones by use of convolutional neural networks and deep reinforcement learning	Curtin University	3.5	Commenced	106,050
M0501	Yihao Fu	Characterisation of ore and bulk solid systems by use of multivariate image analysis and deep learning neural networks	Curtin University	3.5	Commenced	104,006

MRIWA Research Scholarship for Women

The MRIWA Research Scholarship 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)	Status	MRIWA Contribution ($)
M0547	Pollyanna Moro	Geodynamics and basin evolution of the Paterson Orogen from the Paleoproterozoic to Neoproterozoic based on 3D geophysical modelling and data inversion	University of Western Australia	3.5	Commenced	106,050
M0524	Kudzai Angeline Mchibwa	Innovative processes for leach liquor purification and production of battery grade LiOH from Li mineral resources	Murdoch University	3.5	Commenced	105,000

Odwyn Jones Scholarship

The Odwyn Jones Scholarship (formerly the MRIWA Scholarship) is awarded annually. This award is named for Emeritus Professor Odwyn Jones, 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)	Status	MRIWA Contribution ($)
M0548	Xingjie Chen	Investigating the underground support provided by shotcrete using tailings and waste rock	University of Western Australia	3.5	Commenced	105,000
M0502	Zela Ichlas	Development of an industrially applicable electrostatic solvent extraction column for process metallurgy	Curtin University	3.5	Commenced	105,000
M0475	Eun Joo Choi	Investigating geochemical and isotopic features of alkaline rocks of the Yilgarn Craton, in order to define the role of the mantle in the evolution of Archean cratons and identify new mineral deposits	University of Western Australia	3.5	Commenced	69,006
M0474	Rashid Vaneghi	Progressive damage mechanisms of rocks subjected to cyclic loading	Curtin University	3	Commenced	69,006
M0472	Harry Watts	Developing a more benign way to extract rare earths from monazite ore using a sequence of weak organic acids at a moderate pH and room temperature and ore recirculation	University of Western Australia	3	Commenced	69,006
M0454	Siwei Chen	Rock fracture under the action of multiple field coupling	Curtin University	3	Commenced	105,000
M0456	Cameron Adams	An investigation of the relationship between positive magnetic anomalies and nickel-sulphide deposits, Kambalda, Western Australia	University of Western Australia	3.5	Commenced	105,000

Completed in 2019-20

Project No	Scholarship Recipient	Project Title	Host University	Duration (yrs)	Status	MRIWA Contribution ($)
M0457	Stefano Caruso	Mapping sulfur resources in selected Precambrian terranes of Western Australia to enhance predictive targeting for gold and base metal mineralisation	University of Western Australia	3	Completed	105,000
M0463	Ashley Uren	Whole-lithosphere architecture and its controlling influence on basin evolution and mineral systems in the Capricorn Orogeny of Western Australia	University of Western Australia	3.5	Completed	105,000
M0455 & M0450	Evelien Martens	Feasibility of electrokinetic in situ leaching	University of Western Australia	3.5	Completed	126,360

ARC Industrial Transformation Training Centre for Transforming Maintenance through Data Science Scholarships

MRIWA is partnering with the Australian Research Council (ARC), Curtin University, University of Western Australia, CSIRO, Alcoa, BHP, Roy Hill and the CORE Innovation Hub in the ARC Industrial Transformation Training Centre for Transforming Maintenance through Data Science (the Training Centre). The Training Centre seeks to deliver the next generation of data science solutions focused on the problems that industry needs addressed to deliver efficient and effective maintenance.

Through the Training Centre, MRIWA funds two (2) PhD Students.

Project No	Scholarship Recipient	Project Title	Host University	Duration (yrs)	Status	MRIWA Contribution ($)
M0508a	Tyler Bikaun	Conversational agents and dialogue management systems in highly domain specific environments with scarce data	Curtin University	3.5	Commenced	120,000
M0508b	Gabriel Gonzales	Improving predictability of failure and the condition assessment of critical mineral processing assets	Curtin University	3.5	Commenced	120,000

CRC Participation

In addition to contributing to successful Cooperative Research Centres (CRC's) as outlined below, MRIWA provides funding support to enable the development of CRC proposals for consideration by the federal government.

In 2019-20 MRIWA supported the development of the Mining Industry 4.0 bid, which was unsuccessful (M0542).

FUTURE BATTERY INDUSTRIES CRC

The FBI CRC is enabling the growth of battery industries to power Australia's future and ensure Australia plays a leading role in the global battery revolution.

The FBI CRC brings together over 50 partnering organisations, covering the full extent of the battery value chain, including mining, extraction, processing, and refining of battery minerals metals and materials, as well as downstream uses such as precursor chemical manufacture, battery cell manufacture, battery recycling and battery deployment in defence, electrical utilities, mining, and other mobile and stationary applications.

The FBI CRC commenced operation in 2019.

Project Value:	**MRIWA Contribution:**
$116 million comprised of: $25M cash from the CRC Programme $25.7M cash from industry $32.5M non-staff in-kind $32.8M staff in-kind	(M0533) $6 million over 5 years (of which $500,000 is contributed by the Western Australian Department of Jobs, Tourism, Science and Innovation)

MinEx CRC

MinEx CRC is working to develop more productive, safer and environmentally friendly drilling technologies and workflows to improve the success rate and efficiency of discovering and defining mineral deposits.

Key deliveries from the MinEx CRC will include the development of a new drilling rig incorporating revolutionary coiled tubing drilling technology, and new technologies for collecting data while drilling.

The MinEx CRC commenced operation in 2018 and will operate for three contract phases across 10 years.

Project Value:	**MRIWA Contribution:**
$218 million comprised of: $50M cash from the CRC Programme $41M cash from industry $49M non-staff in-kind $78M staff in-kind	(M0509) $1 million over 10 years

CRC ORE
Optimising Resource Extraction

CRC ORE undertakes and promotes technology development and implementation for the Australian and global mining industry.

Its prime directive is to identify and implement innovation that can improve operational value and reverse the marked trend of declining productivity in the mining industry over the past decade. CRC ORE focuses on applied innovation, technology development and technology transfer rather than fundamental research.

CRC ORE commenced operation in 2015.

Project Value:	**MRIWA Contribution:**
$137.7 million comprised of: $34.4M cash from the CRC Programme $42.5M cash from industry $29.6M non-staff in-kind $31M staff in-kind	(M0441) $600,000 over 6 years

Our Research

It is the Institute's goal to have an impactful research program, where applied research creates capability and delivers economic and social benefit for Western Australia.

Organised by Research Priority Plan Program area, this section provides an overview of all research MRIWA supported throughout 2019-20.

Case studies are provided for those research projects approved by the Board and where a research report was made publicly available throughout the year.

MRIWA Project Portfolio

The MRIWA website [1] was redeveloped in 2020 to showcase who we are and what we do.

The revamped website provides a platform to feature current MRIWA-funded research projects, the challenges they are seeking to address and the intended benefits the projects will deliver to Western Australia.

Information on all completed projects is also available via the MRIWA website, with visitors to the site able to view projects by Program area, search by keyword and download technical reports.

[1] https://www.mriwa.wa.gov.au/research-projects/project-portfolio/

Research Portfolio Summary

No. Projects	21	14	21	1	11	2
MRIWA Contribution	$5.4M	$3.9M	$3M	$75K	$2.4M	$436K
Third-Party Contribution	$24.4M	$6M	$11.6M	$175K	$16.5M	$639K
Total Grant Value	**$29.8M**	**$9.9M**	**$14.6M**	**$250K**	**$19M**	**$1.1M**

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

PROGRAM 1: Find More Viable Resources

New Projects Approved by the Board in 2019-20

M0557: Orebody knowledge, landscape history and mineralisation of Martite – Goethite Ores in the Hamersley Province (WA)

Mineral Systems

Lead Organisation	CSIRO	**Total Project Value** $1,552,000
Research Contact	Erick Ramanaidou	
Sponsors	BHP Pty Ltd Bureau Veritas Minerals Pty Ltd FMG Resources Pty Ltd Pilbara Iron Company (Services) Pty Ltd CSIRO Roy Hill Holdings Pty Ltd	**MRIWA Contribution** $388,000 over 2 years

The Challenge

The Hamersley Province is being mined at a rate of >850Mt of iron ore per year so understanding the mineralisation and its relationship to the weathered landscape is critical to targeting new deposits and better characterising orebodies to support long-term sustainability of this iron ore province.

Proposed Solution

This large, multidisciplinary research project by Curtin University, UWA and the Geological Survey of WA supported by all West Australian iron ore producers and Bureau Veritas will provide an integrated 4D understanding of the landscape evolution and weathering history of the Hamersley Province and its relationship to the genesis and mineralisation of Martite-Goethite iron ore deposits. The understanding of mineralisation events will improve orebody knowledge and support enhanced decision making from exploration to mining.

Proposed Benefits to WA

Iron ore is a vital commodity for WA delivering $5B of royalties and supporting 50,000 direct jobs in 2018. Enhanced understanding of Hamersley Province orebodies will assist in finding new deposits and in optimising mining, resulting in greater profitability for producers and sustained royalties and employment for WA.

M0470a: A multi-scale approach to controls on mineralization in the Fraser Zone, Western Australia

Mineral Systems

Lead Organisation	Curtin University	**Total Project Value** $1,023,300
Research Contact	Katy Evans	
Sponsors	Curtin University Geological Survey of Western Australia IGO Limited MG Creasy	**MRIWA Contribution** $341,300 over 3 years

The Challenge

Controls on mineralisation in the Fraser Zone in southeastern WA remain poorly understood, despite high prospectivity demonstrated by recent discoveries in the region and previous MRIWA study M0470 across the broader Fraser Orogen.

Proposed Solution

Shifting focus from the orogen-scale to the narrower Fraser Zone through a multi-scale, multidisciplinary approach will provide detailed understanding of prospective structures and the geochemical and isotopic fingerprints that could help explorers identify mineralisation in this poorly understood area.

Proposed Benefits to WA

The primary benefits to Western Australia's industry and community will be through enhanced mineral exploration success and increased royalties to the state, with further benefits also derived through the geological training of students in an applied industry setting.

M0509d: Centrifuge optimisation for fluid management in Coiled Tubing drilling

Detection Technology

Lead Organisation	MinEx CRC	**Total Project Value** $1,923,125
Research Contact	Andrew Bailey	
Sponsors	MinEx CRC	**MRIWA Contribution** $471,875 over 1.75 years

The Challenge

Current Hydraulic Processing Systems are not able to treat the large volumes of fluid bringing drill cuttings to the surface in Coiled Tubing drill rigs. This both results in un-necessarily high consumption of drilling fluids and creates problems in representative sampling.

Proposed Solution

This research program will develop a customisable centrifuge to be incorporated within the Hydraulic Processing Unit of a Coiled Tubing drilling rig, allowing drilling performance to be optimised under a range of drilling conditions.

Proposed Benefits to WA

Resolution of these issues will enable use of the coiled tubing drill rig in areas of Western Australia where there is a need for efficient, rapid, lower-cost, deeper exploration with a low environmental foot print.

M0462a: The paradigm shift for minerals exploration using ultrafine soils and intelligent data integration tools

Detection Technology

Lead Organisation	CSIRO	**Total Project Value** $839,249
Research Contact	Ryan Noble	
Sponsors	Condamine Resources Limited, De Grey Mining Ltd, Fortescue Metals Group Ltd, Geological Survey of NSW, Geological Survey of Queensland, Geological Survey of SA, Geological Survey of WA, Kaiross Minerals, Kalamazoo Resources Pty Ltd, MCA Nominees Pty Ltd, Mining Investments Australia Pty Ltd, Newmont Mining Corporation, Northern Star Resources Ltd, NT Geological Survey, Tojo Minerals Pty Ltd	**MRIWA Contribution** $117,000 over 3 years

The Challenge

Greenfields exploration in Australia is in decline, and much of the nation's remaining potential mineral wealth is masked by regolith cover, presenting a barrier to identifying new ore deposits by traditional exploration methods.

Proposed Solution

This project will develop an improved geochemical workflow for separating and analysing ultrafine (<2 µm) particle fractions from soils. This soil fraction has been demonstrated to offer a geochemical signature for mobile elements that can reveal the presence of anomalous mineral concentrations even beneath transported cover rocks.

Proposed Benefits to WA

This work will improve ability to identify ore body targets and make qualified decisions in exploring for mineralisation beneath regolith cover.

Current Projects

	Project No	Project Title	Lead Org. and Contact	Sponsors	Duration (yrs)	Total Project Value $	MRIWA Contribution $
Mineral Systems	M0554	Evolution of Proterozoic multistage rift basins – key to mineral systems	The University of Western Australia Mark Jessell	Australian Research Council Anglo American PLC BHP Pty Ltd CSIRO Geological Survey of Western Australia IGO Limited Monash University Teck Australia Pty Ltd University of Sydney University of Western Australia	4	2,388,576	540,837
	M0551	Integrated 3G - Geochronology-geochemistry-grain shape: a new toolkit for mineral sands understanding	Curtin University Milo Barham	Curtin University Iluka Resources Limited	3	740,000	260,000
	M0530	Yilgarn 2020	Centre for Exploration Targeting (UWA) Nicolas Thebaud	BHP Nickel West Pty Ltd Bogada Gold Pty Ltd Evolution Mining Limited Gold Fields Australia Pty Ltd Gold Road Resources Limited Newmont Goldcorp Services Pty Ltd Northern Star Resources Ltd Saracen Mineral Holdings Limited	3	2,421,000	796,000
	M0521	Lithospheric and crustal-scale controls on multi-stage basin evolution: Impacts on mineralising systems	Centre for Exploration Targeting (UWA) Weronika Gorczyk	Centre for Exploration Targeting (UWA) First Quantum Minerals Ltd Fortescue Metals Group Ltd Geological Survey of Western Australia	4	1,493,737	733,737

	Project No	Project Title	Lead Org. and Contact	Sponsors	Duration (yrs)	Total Project Value $	MRIWA Contribution $
Mineral Systems	M0448	4D Evolution of WA ore systems (WA4D): Rutile - pathfinder to ores	Curtin University Neal McNaughton	Curtin University Geological Survey of Western Australia IGO Limited	3	489,763	263,113
	M0446	4D Evolution of WA Ore Systems (WA4D): Re-Os Sulfide Geochemistry	Curtin University Neal McNaughton	Curtin University Geological Survey of Western Australia Thermo Fisher Scientific Australia Pty Ltd	3	341,650	175,000
	M0424	Multiscale dynamics of hydrothermal mineral systems	University of Western Australia Alison Ord	AngloGold Ashanti Australia Limited First Quantum Minerals (Australia) Pty Ltd Geological Survey of Western Australia Silver Lake Resources Limited	4	630,000	210,000

	Project No	Project Title	Lead Org. and Contact	Sponsors	Duration (yrs)	Total Project Value $	MRIWA Contribution $
Detection Technology	M0543	Field-based XRF for prompt Au analysis	Portable PPB Pty Ltd Simon Bolster	Barrick Gold Corporation Bellevue Gold Limited Centerra Gold Inc Fosterville Gold Mine Pty Ltd Gold Road Resources Limited Newcrest Mining Limited Perseus Mining Limited St Ives Gold Mining Company Pty Limited (Gold Fields)	1	658,000	218,000
	M0514	Novel seismic methodologies for exploration of mineral resources in a hypersaline environment	Curtin University Milovan Urosevic	HiSeis Pty Ltd Matsa Gold Pty Ltd	2	280,000	90,000
	M0515	Development of drilling fluid system for the Coiled Tube drill rig	Curtin University Masood Mostofi	Curtin University Deep Exploration Technologies CRC	1	400,000	150,000
	M0509b	Petrophysics for mineral discovery during drilling	MinEx CRC Andrew Bailey	MinEx CRC	3	10,578,700	111,700
	M0509c	Seismic in the drilling workflow	MinEx CRC Andrew Bailey	MinEx CRC	3	1,403,600	111,700
	M0509a	Coiled tubing drilling for definition of mineral deposits	MinEx CRC Andrew Bailey	MinEx CRC	3	2,294,700	110,000

Reports Published in 2019-20

M0436: Distal footprint of giant ore systems: Capricorn WA case study

Mineral Systems

Lead Organisation	CSIRO- Mineral Resources Flagship	**Total Project Value** $7,580,000
Research Contact	Tim Munday	
Sponsors	CSIRO	**MRIWA Contribution** $2,580,000 over 3 years

The Challenge

- Although hosting world-class mineral deposits, large areas of Western Australia's Capricorn region are covered by sediments that shield the richly-endowed regional geology from view.
- The comparatively tiny volume of concentrated mineralisation in a viable ore system makes intersecting a buried deposit with even a well-targeted exploration drill hole statistically unlikely.

Key Findings

- The Capricorn region bears important geological links to the richly-endowed Yilgarn and Pilbara, including tectonic events associated with mineralisation.
- Known gold, uranium, and base metal deposits in the Capricorn are associated with distinctive groundwater geochemistry.
- These chemical signatures extend beyond the mineral deposits themselves, making them a useful marker for targeting buried minerals.
- Archean-related sulfur isotope signatures beyond the exposed Yilgarn and Pilbara Cratons may provide insight into mineral deposit sources.

Benefits to WA

- Geochemical techniques developed through this work advance a new means of exploring for mineral deposits beneath barren cover rocks throughout WA.
- This study establishes the potential existence of mineralised geology that will encourage exploration in under-explored areas of the Capricorn region.
- Follow-up investment from exploration companies is helping target the next generation of mineral deposits in Western Australia.

M0465: Deep crustal-scale structure, geological evolution and multi-commodity prospectivity analysis in the Halls Creek Orogen, Kimberley region, Western Australia

Mineral Systems

Lead Organisation	University of Western Australia	**Total Project Value** $45,945
Research Contact	Alan Caldwell	
Sponsors	Panoramic Resources Limited	**MRIWA Contribution** $33,445 over 3 years

The Challenge

- Many geochemical investigations have been undertaken across the Halls Creek orogen, but the utility of these in exploration terms is limited in the absence of uniformity and systematic coordination of the available data.

Key Findings

- This work produced a new approach for integrating geodynamic models and Lu/Hf analysis to constrain tectonic evolution.
- Sm/Nd analysis of the region is also shown to provide a proxy for fertility.
- This technique delivered new insight into the tectonic evolution of the Halls Creek Orogen, and the structural controls on gold and nickel mineral systems across this region.
- These insights delivered new gold and nickel prospectivity models for the Halls Creek Orogen.

Benefits to WA

- The new methodologies and prospectivity insights delivered through this work will assist the exploration industry in finding new mineral deposits in Western Australia.

M0470: Mineral systems on the margin of cratons: Albany-Fraser Orogen / Eucla Basement case study

Mineral Systems

Lead Organisation	Curtin University	**Total Project Value** $765,288
Research Contact	Chris Kirkland	
Sponsors	Curtin University Geological Survey of Western Australia Ponton Minerals Pty Ltd	**MRIWA Contribution** $250,288 over 3 years

The Challenge

- Recent discoveries in the Albany–Fraser region demonstrate the previously under-appreciated potential of high-grade metamorphic rocks to host major ore bodies.
- Mineralisation in high-grade rocks is associated with different signatures to those targeted in common exploration models.
- Efficient targeting of mineralisation in high-grade regions requires development of new approaches to geological exploration.

Key Findings

- Deformation at the margins of ancient continental fragments is associated with geological discontinuities that focus fluids and heat and, under favourable circumstances, may become mineralised corridors.
- The Albany–Fraser region has a deep compositional grain reflecting common inheritance with the richly-endowed Yilgarn Craton.
- Distinctive variations in the geochemistry and sulfur isotopes incorporated within the metamorphosed rocks record a protracted history of fluid flow and mineralisation predating major deformation of the Albany–Fraser Orogen.

Benefits to WA

- This work delivers enhanced understanding of the development and expression of mineralisation in the emerging Albany–Fraser mineral province, and highlights a number of prospective areas.
- These insights will help reduce exploration risk in the region, and encourage industry investment in finding the next generation of ore bodies in WA.

M0476: An integrated multi-scale study of crustal structure and prospectivity of the Eastern Yilgarn Craton and adjacent Albany-Fraser Orogen

Mineral Systems

Lead Organisation	University of Western Australia	**Total Project Value** $652,948
Research Contact	Mark Lindsay	
Sponsors	Geological Survey of Western Australia Yamarna South Joint Venture	**MRIWA Contribution** $312,948 over 2.5 years

The Challenge

- Although known to host world-class mineral deposits, the Eastern Yilgarn Craton and Albany-Fraser Orogen are largely covered by sediments that post-date mineralisation and shield the highly-endowed regional geology from view.
- Recognising mineralisation through this cover to target exploration investment effectively requires the development of new exploration methods.

Key Findings

- Machine learning techniques developed here produce an enhanced interpretation of sub-surface geology by integrating multiple geophysical datasets together with rock properties identified through exploratory drilling.
- The new computational techniques developed can be combined with relatively inexpensive magnetotelluric imaging to make sub-surface geological structures easier to see in seismic data.
- This work defines several domains of elevated prospectivity that will help industry better target mineral exploration beneath barren cover rocks in the studied region .
- One of these prospective domains hosts the rich Gruyere gold deposit.

Benefits to WA

- This study establishes the potential existence of mineralised geology that will encourage exploration investment in under-explored eastern regions of the Yilgarn Craton.
- The techniques developed to improve understanding of existing geoscientific data can be applied to boost exploration productivity in other regions of WA.

M0494: Mapping the chemical architecture of gold camps

Mineral Systems

Lead Organisation	CSIRO	**Total Project Value** $1,021,180
Research Contact	Renee Birchall	
Sponsors	Blackham Resources Limited Department of Industry, Innovation and Science Echo Resources Limited Evolution Mining Limited Gold Road Resources Limited Northern Star Resources Ltd Ramelius Resources Limited Saracen Mineral Holdings Limited	**MRIWA Contribution** $410,000 over 1.2 years

The Challenge

- Some parts of Western Australia have produced fewer gold discoveries than statistically expected from their underlying Archean geology, suggesting the possible existence of undiscovered gold resources.
- Conventional exploration techniques have failed to detect these resources, pointing to a deficiency in our understanding.

Key Findings

- Hydrothermal gold deposition in the major Archean mineralisation events recognised in Western Australia produced distinctive alteration patterns around fluid pathways and ore deposits.
- This chemical alteration extends much further than the gold mineralisation itself, affecting domains on the order of several cubic kilometres.
- These alteration zones could provide a means to identify other areas where ancient ore fluids passed through the bedrock, and to identify prospective areas where local conditions drove mineralisation.

Benefits to WA

- The insights delivered by this research provide a cost-effective method for mapping gold systems and targeting high grade resources in the Archean rocks of Western Australia.
- This understanding will reduce the risk in targeting ore bodies that conventional exploration has failed to identify, encouraging investment in under-explored areas of the state.

M0449: Drop probe system – reverse circulation log-while-drilling (RC LWD)

Detection Technology

Lead Organisation	Globaltech Corporation Pty Ltd	**Total Project Value** $300,000
Research Contact	Gordon Stewart	
Sponsors	Globaltech Corporation Pty Ltd Boart Longyear Limited	**MRIWA Contribution** $150,000 over 1.75 years

The Challenge

- Geophysical probe technology currently used by the drilling industry cannot be deployed during active reverse circulation (RC) drilling.
- This reduces the efficiency of automated logging of RC drillholes.
- Active RC drilling provides a hostile environment for sensors, requiring equipment to be highly robust.

Key Findings

- The 'Drop and Forget' (drop probe) solution developed in this research program can be deployed during standard RC drilling operations without changing the operational risk profile.
- Laboratory trials of probe deployment were successful in both water-filled and air-filled hole environments.
- The probe was able to undergo free-fall drops in initial trials without damaging electronic sensors.

Benefits to WA

- Successful implementation of drop probe technology would make exploration drilling more efficient by allowing surveying of rock properties during RC drilling operations.
- Speeding up the RC drilling process and removing the need for a separate surveying team would offer significant cost savings to the mining industry.

M0493: Don't bury Western Australia's geophysical data: Uncovering prospective mineral terrains with regional potential field, seismic and MT transects through cooperative inversion

Detection Technology

Lead Organisation	Curtin University	**Total Project Value** $257,900
Research Contact	Brett Harris	
Sponsors	MinEx CRC	**MRIWA Contribution** $125,300 over 1.5 years

The Challenge

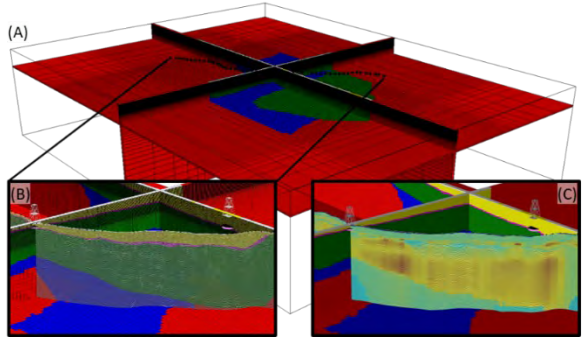
- Many of Australia's prospective mineral terrains extend beneath layers of sedimentary rock, shielding possible ore deposits from discovery.
- Recognising clues that may point to mineralisation through this cover to better target exploration investment requires the development of new exploration methods.

Key Findings

- Cooperative inversion of magnetotelluric and seismic data using the software toolbox developed in this research produces better interpretations of the sub-surface geology than either dataset could independently.
- Tested on datasets crossing the Yilgarn Craton–Officer Basin–Musgrave Province of Western Australia, this approach was able to successfully predict rock properties down to depths exceeding those of routine mineral exploration, and reveal previously hidden geological features.

Benefits to WA

- The cooperative inversion method developed in this research unlocks additional value in existing geophysical datasets covering Western Australia, without requiring expensive new studies.
- This improved constraint of sub-surface geology will reduce the risk in targeting major ore bodies beneath barren cover rocks, encouraging exploration investment in under-explored areas of the state.



Prior 3D model (A) and (B) and section through model after inversion (C) of magnetotelluric data. The 2D profile data of the YOM line was subject to 3D inversion using the ModEM3D software. The prior model was based on an adapted 3D geological GOCAD model.

M0467: Mineralogical and lithological controls on Rare Earth Elements distribution in the Argyle diamond deposit

Mineral Systems

Lead Organisation	Curtin University	**Total Project Value** $60,000
Research Contact	Louisa O'Connor	
Sponsors	Argyle Diamonds	**MRIWA Contribution** $30,000 over 2 years

The report for M0467 was published in 2018-19 and financial acquittal finalised in 2019-20

PROGRAM 2: Expand the Mining Envelope

New Projects Approved by the Board in 2019-20

M0545: Evaluation of in-situ barrier technology for risk mitigation and extraction optimisation for in-situ-recovery operations

Deep and Complex Extraction Systems

Lead Organisation	Curtin University	**Total Project Value** $225,000
Research Contact	Navdeep Dhami	
Sponsors	BHP Pty Ltd CMTE Development (trading as Mining3) Newcrest Mining Limited Orano Mining	**MRIWA Contribution** $75,000 over 1.25 years

The Challenge

The mining industry is increasingly acknowledging the opportunity to reconsider use of in-situ recovery (ISR) approaches for a broad range of mining activities. Risk mitigation associated with the potential loss of lixiviant and solubilised metals beyond the wellfield and into groundwater systems is critical before this approach can be implemented.

Proposed Solution

Development of novel sustainable bio-based strategies to create robust bio-cement barriers for application in ISR operations on mining sites.

Proposed Benefits to WA

ISR offers the opportunity to reduce the impact of mining on the landscape by minimising surface disruption.
Applicable to a variety of Western Australian commodities, the creation of sustainable barriers and development of new methods for efficient lixiviant containment could also prolong the operation of existing mines or convert sub-economic mineral systems into commercial prospects delivering jobs and ongoing royalties.

Current Projects

	Project No	Project Title	Lead Org. and Contact	Sponsors	Duration (yrs)	Total Project Value $	MRIWA Contribution $
Deep and Complex Extraction Systems	M0544	Towards a mechanistic understanding of electrokinetic in situ leaching	University of Western Australia Andy Fourie	BHP Pty Ltd Evolution Mining Limited Newcrest Mining Limited Newmont Mining Services Pty Ltd	3	842,605	290,605
	M0529	Lixiviant access creation in impermeable hard rock mass for the in situ underground leaching of metals from ore	Murdoch University Aleks Nikoloski	CMTE Development (trading as Mining3) Murdoch University	3	120,000	30,000

	Project No	Project Title	Lead Org. and Contact	Sponsors	Duration (yrs)	Total Project Value $	MRIWA Contribution $
Engineering in Highly Stressed and Complex Rock Masses	M0499	Establishing the in situ rock bolt behaviour underground in order to model and design improved rock bolt support systems	Curtin University Ernesto Villaescusa	Curtin University CMTE Development (trading as Mining3) Peabody Energy Australia Pty Ltd	3	1,270,000	400,000
	M0489	Probabilistic stope design	Australian Centre for Geomechanics (ACG) Yves Potvin	Agnico Eagle Mines Limited BHP Pty Ltd Mount Isa Mines Limited (Glencore) Gold Fields Australia Pty Ltd Hecla Québec - Bureau Administratif Val-d'Or Iamgold Corporation Mine Westwood MMG Limited	2	430,000	85,000
	M0497	Ground support systems optimisation - Phase 2	Australian Centre for Geomechanics (ACG) Yves Potvin	Australian Centre for Geomechanics (ACG) Agnew Gold Mining Company Pty Ltd (Gold Fields) Agnico Eagle Mines Limited Cadia Holdings Pty Limited(Newcrest) Dywidag-Systems International Pty Ltd Fero Strata Systems Pty Ltd Garock Pty Ltd Iamgold Corporation Mine Westwood IGO Limited Jennmar Australia Pty Ltd New Concept Mining Sandvik Mining and Construction Australia Pty Ltd St Ives Gold Mining Company Pty Limited (Gold Fields)	3	1,931,250	671,250

	Project No	Project Title	Lead Org. and Contact	Sponsors	Duration (yrs)	Total Project Value $	MRIWA Contribution $
Engineering in Highly Stressed and Complex Rock Masses	M0464	Rock properties to predict rockburst vulnerability in three dimensions	Australian Centre for Geomechanics (ACG) Phil Dight	Australian Centre for Geomechanics (ACG) Agnew Gold Mining Company Pty Ltd (Gold Fields) Agnico Eagle Mines Limited AngloGold Ashanti Australia Limited BHP Nickel West Pty Ltd BHP Pty Ltd Ernest Henry Mining Pty Ltd Gold Fields Australia Pty Limited GSM Mining Company Pty Ltd (Gold Fields) Iamgold Corporation Mine Westwood LKAB Newcrest Mining Limited Northern Star (Kanowna) Limited St Ives Gold Mining Company Pty Limited (Gold Fields) Sudbury Integrated Nickel Operations (Glencore) Tritton Resources Pty Ltd	4	2,140,000	1,100,000

	Project No	Project Title	Lead Org. and Contact	Sponsors	Duration (yrs)	Total Project Value $	MRIWA Contribution $
Mining Technology	M0522	Physics models for ore tracking in surface mines	CMTE Development (trading as Mining3) Paul Lever	Fortescue Metals Group Ltd South32 Limited	1.5	760,000	380,000
	M0518	Real-time mining face grade determination using hyperspectral imaging techniques	Plotlogic Pty Ltd Andrew Job	AngloGold Ashanti Australia Limited CITIC Pacific Mining Management Pty Ltd	1	850,850	250,000
	M0510	Safe, sustainable management of filtered tailings	University of Western Australia Andy Fourie	Alcoa of Australia Limited Alumina Quality Workshop (Inc) BHP Pty Ltd International Aluminium Institute Rio Tinto Technological Resources Pty Ltd	3	482,500	142,000
	M0487	Hard rock disc cutting technologies: Fundamentals of cutter/rock interaction and rock failure mechanism	CMTE Development (trading as Mining3) Sevda Dehkhoda	CMTE Development (trading as Mining3)	3	550,000	200,000

Report Published in 2019-20

M0431: Ground support systems optimisations (GSSO)

Engineering in Highly Stressed and Complex Rock Masses

Lead Organisation	Australian Centre for Geomechanics (ACG), The University of Western Australia	**Total Project Value** $1,560,000
Research Contact	Yves Potvin	
Sponsors	Atlas Copco Australia Pty Ltd CODELCO - (Div Casa Matriz) Dywidag-Systems International Pty Limited Fero Strata Systems Pty Ltd GeoBrugg AG Switzerland Golder Associates Pty Ltd IGO Limited Jennmar Australia Pty Ltd MMG Limited Mount Isa Mines Limited	**MRIWA Contribution** $240,000 over 4 years

The Challenge

- Ground support constitutes a major proportion of mining costs in modern operations, but many ground support design practitioners have been slow to adopt innovation, with practice based on civil engineering methodology un-suited to underground mine development.

Key Findings

- Current industry ground support design is largely empirical, inefficient, and evolves organically in different corporate and operational contexts.
- The probabilistic and risk-based ground support design methodology developed through this research may suit the operational needs of the underground mining environment better than existing practice.
- Numerical modelling may be useful for some elements of ground support design, but the expertise required to apply this approach in practice is not widely available on mine sites.

Benefits to WA

- The design methodology developed will improve safety, productivity, and cost-effectiveness in WA's mining industry.
- The project has enhanced WA's reputation as a global leader in the development and export of geomechanics technology.
- Continuation of the research has attracted funding and talent to WA from interstate and overseas.

M0482: Development and evaluation of fume free explosives for underground blasting applications

Mining Technology

Lead Organisation	CMTE Development (trading as Mining3)	**Total Project Value** $210,000
Research Contact	Italo Onederra	
Sponsors	Barrick Gold Corporation Newcrest Mining Limited Northern Star Resources Ltd	**MRIWA Contribution** $84,000 over 1 year

The Challenge

- Conventional Ammonium Nitrate (AN)-based explosives represent a substantial source of nitrate release into the environment, and produce undesirable exhaust gases including nitrogen dioxide (NO_2), nitric oxide (NO) and carbon monoxide.
- These pose a substantial hazard to mine workers, particularly in enclosed underground environments.
- Hydrogen Peroxide (H_2O_2)-based explosives could reduce or eliminate these negative effects, but their performance in a mining environment is unproven.

Key Findings

- H_2O_2-based explosive hydrogel proved capable of being loaded and fired in an underground environment and produced detonation and blast performance comparable to AN-based products in early field trials.
- The breakdown products of H_2O_2-based hydrogels are oxygen gas and water vapour.
- Their use eliminates the release of potentially hazardous NOx and nitrate compounds produced by conventional AN-based explosives.
- H_2O_2 hydrogels also produced lower carbon monoxide (CO) output than conventional AN-based equivalents.
- The reduced levels of this dangerous gas would reduce corresponding safety concerns and assist miners with operational planning.

Benefits to WA

- Adoption of H_2O_2-based explosive gels will help improve worker safety and lower the cost of mine development in WA's underground mining industry, especially where H_2O_2 is already utilised on-site.
- Adoption of H_2O_2-based explosives would also reduce the environmental impact of mining operations in WA through the elimination of nitrate release in blasting and resulting waste products.

M0495: A Study of nano diesel particulate matter (nDPM) behaviour and physico-chemical changes in underground hard rock mines of Western Australia

Safety, Social and Environmental Responsibility

Lead Organisation	ChemCentre	**Total Project Value** $516,120
Research Contact	Silvia Black	
Sponsors	Department of Mines, Industry Regulation and Safety	**MRIWA Contribution** $166,120 over 1 year

The Challenge

- Widespread use of diesel-powered vehicles in underground mining introduces substantial pollution to the mine environment – particularly in the form of Nano Diesel Particulate Matter (nDPM).
- Monitoring and mitigating human exposure to this pollution imposes a significant cost on mine operators.

Key Findings

- The tracer gas sulfur hexafluoride (SF6) allowed characterisation of air flow behaviour and mapping of particulate transport between nDPM sources and nearby equipment operators.
- This allowed definition of the potential real-time exposure of underground workers and the efficiency of secondary ventilation systems at each worksite over similar periods of time.

Benefits to WA

- The understanding provided by this research will allow mine operators in WA to better understand and mitigate nDPM in the underground environment, leading to cost savings and improved worker safety across the industry.

PROGRAM 3: Increase Recovered Value Through Processing

New Projects Approved by the Board in 2019-20

M0441g: Integrated screening and particle sorting collaborative study

Processing Technology

Lead Organisation	CRC ORE	**Total Project Value** $451,210
Research Contact	Greg Wilkie	
Sponsors	CRC ORE	**MRIWA Contribution** $150,000 over 1.5 years

The Challenge

Particle sorting is a Grade Engineering lever that can be used to separate high grade material from waste, provided a sensor can detect the difference. A drawback however is the lack of a standard methodology to generate theoretical particle sorting yield curves and associated errors from a limited number of samples.

Proposed Solution

Recent research shows that coarse particle grade distributions for Cu and Au often exhibit lognormal properties, which can be reliably generated from as little as 50 to 100 particles. Using a combination of these curves and Monte Carlo simulation methods, this project will develop an industry standard particle sorting amenability test that requires a limited number of samples to compare against vendor generated yield curves with error estimation and determine vendor yield curve efficiency.

Proposed Benefits to WA

Many ore types can benefit from preconcentration by particle sorting. Some that are particularly amenable include gold and lithium ores, both of which are economically significant to Western Australia. Benefits include reduction in operating costs and water and energy intensity of operations as well as more sustainable waste emplacement for mine sites that implement the technology. Preliminary studies suggest the value of benefits to a mine site could exceed >$10M over LOM, and sector benefits could be an order of magnitude higher.

M0441h: Mine site validation of a real-time fluorine mineral sensor

Processing Technology

Lead Organisation	CRC ORE	**Total Project Value** $619,741
Research Contact	Greg Wilkie	
Sponsors	CRC ORE BHP Pty Ltd Newcrest Mining Limited	**MRIWA Contribution** $120,000 over 1.75 years

The Challenge

The presence of fluorine in many saleable ore products attracts a penalty and is thus an important consideration for short term production management. Current methods for real-time elemental analysis are either not suitable for light elements such as fluorine; or are delivered offline with long turnaround times.

Proposed Solution

A non-contact optical technique that uses novel fluorescence signatures for real-time identification of fluorine abundance and mineral speciation is proposed. A proof-of-principle that exploits near-infrared (NIR) signatures from fluorine-bearing minerals has already been developed using the Upconversion Fluorescence (UF) research facility funded by the CRC ORE. This project will build on science that is sufficiently progressed to create and test a field-deployable prototype system based on novel forms of fluorescence. Once established, the technology will be assessed for other known penalty elements e.g. P, As, etc.

Proposed Benefits to WA

The ability to better manage fluorine and potentially other penalty elements will reduce costs and improve the sustainability and competitiveness of mining operations impacted by these elements. Phosphorus is a significant issue in the Iron Ore industry and a pathway to better manage this is of significant benefit to WA.

M0533e and M0533f: Hydrometallurgical processing for nickel and cobalt ores, concentrates, tailings, wastes - Stages 1 and 2

Processing Technology

Lead Organisation	Curtin University (Stage 1)	**Total Project Value** $3,929,369
Research Contact	Elsayed Oraby	
Stage 1 Sponsors	FBI CRC, BASF, BHP Pty Ltd, Blackstone Minerals Limited, Curtin University, IGO Limited, Mining and Process Solutions Pty Ltd, Murdoch University University of Melbourne, University of Western Australia,	**MRIWA Contribution** $500,000 over 4 years

The Challenge

Recovery of metal lost in conventional processing and accessing additional ores not currently economically treatable with traditional processes.
This includes:

- Recovery of nickel and cobalt from float tails, low grade ores, slags.
- Developing methods for treating flotation concentrates to produce a more valuable nickel sulfate product for the battery industry.

Proposed Solution

Demonstrating economic extraction from resources previously classified as waste or marginal for the production of battery precursor chemicals using a novel alkaline leach system to increase recovery of nickel and cobalt. It has been estimated there is in excess of 240Mt of tailings in Western Australia grading at 0.5% Ni and initial work has shown 60% of this can be recovered through leaching. Ideally this technology is best suited for lower grade, highly disseminated nickel-cobalt sulfide ores.

Proposed Benefits to WA

Economically viable alternative leach technologies for extraction of nickel and cobalt from waste streams has the potential to unlock upwards of $20 billion dollars' worth of nickel and cobalt to the battery industry. Achieving this would help position Australia as an exporter of value-added products rather than just raw materials in the battery minerals value chain.

M0533i and M0533v: Benefication and chemical processing of lithium minerals - Stages 1 and 2

Processing Technology

Lead Organisation	Murdoch University	**Total Project Value** $2,263,550
Research Contact	Aleks Nikoloski	
Sponsors	FBI CRC, Calix Limited, Curtin University, University of Technology Sydney	**MRIWA Contribution** $300,00 over 4 years

The Challenge

Lithium is produced by a small number of suppliers, with companies exporting the lithium minerals mainly as concentrate, achieving limited profit margins. Improved technology for the extraction of lithium minerals and refining of battery grade lithium chemicals and the development of integrated process technologies are necessary to enable the emerging battery manufacturing industry in Australia.

Proposed Solution

The production of lower-cost battery-grade lithium chemicals in Australia will pave the way for their use as battery precursor ingredients in local production of electrode materials and electrolytes for lithium-ion batteries

This requires improved process options for lithium extraction, recovery and purification; minimisation of energy consumption; achieving high extraction rate of lithium from lithium minerals; and processes to manage the waste streams that generate by-products.

Establishing value for the waste streams and development of downstream opportunities towards zero liquid discharge technologies are also targeted.

Proposed Benefits to WA

The improved technology will assist WA suppliers in meeting current challenges in processing, developing optimised and alternative processes, delivering tangible benefits to WA in the form of jobs and growth of local communities, at the same time lowering environmental impact.

Current Projects

	Project No	Project Title	Lead Org. and Contact	Sponsors	Duration (yrs)	Total Project Value $	MRIWA Contribution $
Processing Technology	M0541	Organic acid leach system for rare earth extraction technology development	Curtin University Laurence Dyer	Curtin University Department of Industry, Innovation and Science Mt Weld Mining Pty Limited	4.3	345,160	115,000
	M0537	The effect of water quality on rare earth minerals flotation	Curtin University Bogale Tadesse	Curtin University Mt Weld Mining Pty Limited	3.9	210,500	70,000
	M0532	Geology, mineralogy and metallurgy of eMaterials deposits in WA	Curtin University Mark Aylmore	Geological Survey of Western Australia Lithium Australia NL Rio Tinto Exploration Pty Limited	2	525,146	175,146
	M0519	Broadening the opportunity for in-situ recovery of value from mineral deposits	CMTE Development (trading as Mining3) Paul Lever	Barrick Gold Corporation CMTE Development (trading as Mining3) Cytec Industries Incorporation Environmental Copper Recovery (SA) Pty Ltd Freeport Minerals Corporation Hatch Heathgate Resources Pty Ltd Mining and Process Solutions Pty Ltd Newcrest Mining Limited Newmont USA Limited St Ives Gold Mining Company Pty Limited (Gold Fields)	3	960,000	240,000

	Project No	Project Title	Lead Org. and Contact	Sponsors	Duration (yrs)	Total Project Value $	MRIWA Contribution $
Processing Technology	M0505	Glycine heap leaching	Mining and Process Solutions Pty Ltd Ivor Bryan	Barrick Gold Corporation Gindalbie Metals Ltd. Mining and Process Solutions Pty Ltd Poseidon Nickel Limited. Sandfire Resources LimitedL	2	700,000	265,000
	M0488	Understanding fluid-rock interactions and lixiviant/oxidant behaviour for the in-situ recovery of metals from deep ore bodies	CSIRO- Mineral Resources Flagship Laura Kuhar	BASF Australia Ltd Curtin University	3	239,364	100,500
	M0458	A novel direct leach approach to extract Platinum group metals (PGM) from the Panton Sill PGM deposit in the Kimberley region of WA	Curtin University Alireza Rabieh	Curtin University Savannah Nickel Mines Pty Ltd	3.5	510,860	200,000
	M0441f	Investigation the relationship between Ore grade and size fraction in the Kalgoorlie-Boulder region	CRC ORE Laurence Dyer	CRC ORE	0.5	83,800	43,000
	M0534	On-belt gamma activation analysis (GAA) sensing for gold: Phase 3 - Preparation for pilot plant campaign	CRC ORE Paul Revell	CRC ORE	1	236,000	62,000
	M0503	Integration of enhanced grade engineering grade by size gangue liberation and more energy efficient comminution	CRC ORE Paul Revell	CRC ORE	2	976,748	75,000

Reports Published in 2019-20

M0485: GE.VIEW.WA - Developing new tools and resources for benchmarking Grade Engineering® opportunity for the WA gold mining industry

Processing Technology

Lead Organisation	CRC ORE	**Total Project Value** $220,000
Research Contact	John Rutter	
Sponsors	CRC ORE	**MRIWA Contribution** $74,000 over 1 year

The Challenge

- The mining industry is in the midst of a productivity and investment crisis.
- Industry perception is that low grade ore is unavoidable in terms of mass mining.
- The capital and energy costs of using a traditional crush-grind-float processing method for low grade deposits produces poor productivity.

Key Findings

- The GE.View tool produced in this project uses predictive modelling of heterogeneity to identify Grade Engineering opportunities in the Western Australian minerals industry from public domain data.
- Using the GE. View tool as an industry standard would increase productivity and output across the industry.
- The technology is also able to filter and rank individual operations for the highest opportunity to facilitate planning and sequencing decisions.

Benefits to WA

- The new industry standards for ore deposit characterisation delivered through this work will improve productivity and ore grade output across the Western Australian mining industry.
- This will deliver economic benefits to the state including enhanced productivity and employment.

M0500: On-belt gamma activation analysis (GAA) sensing for gold: Phase 2 - Buildable prototype design and laboratory testing of components

Processing Technology

Lead Organisation	CRC ORE	**Total Project Value** $572,000
Research Contact	Steve Walters	
Sponsors	CRC ORE	**MRIWA Contribution** $75,000 over 1 year

The Challenge

- The gold industry faces a projected future of decreasing grades and increased deposit complexity.
- Detector performance could help maintain optimal performance in mineral processing.
- To achieve this, detectors would need to deliver accurate measurement of gold content in real time for feed moving into a processing circuit.

Key Findings

- This research delivered a buildable, costed design for an on-belt gold ore sensing pilot facility delivering direct performance measurement on an operating conveyor.
- The principal components of this system include include a high-power X-ray source, detector array, radiation conveyor, and main shield.
- This plan could be directly translated to a site-based trial at a production ore feed rate.

Benefits to WA

- The new technological solution delivered by this research will support improvements in the efficiency and profitability of the Western Australian gold industry.
- As gold mining becomes more efficient and effective, it boosts the Western Australian economy, stimulating import, exports and trade.

PROGRAM 4: Infrastructure and Logistics Processing

New Projects Approved by the Board in 2019-20

No Projects Approved within this Program for the period.

Current Projects

	Project No	Project Title	Lead Org. and Contact	Sponsors	Duration (yrs)	Total Project Value $	MRIWA Contribution $
Communications and Positioning Technology	M0507	QA4UAV - A standard workflow to quality assure UAV products	CRC SI Nathan Quadros	CRC for Spatial Information Department of Environment Land Water and Planning	1	250,000	75,000

Reports Published in 2019-20

No Reports Published within this Program for the period.

PROGRAM 5: New Products and Markets

New Projects Approved by the Board in 2019-20

M0533c and M0533d: Process legacy - Stages 1 and 2

Downstream Processing Technology

Lead Organisation	Curtin University (Stage 1)	**Total Project Value** $5,776,778
Research Contact	Arie van Riessen	
Stage 1 Sponsors	FBI CRC, Australasian Pozzolan Association Inc, ChemCentre, Covalent Lithium Pty Ltd, Curtin University, FYI Resources Limited, Galaxy Resources Limited, IGO Limited, Lava Blue Ltd, Multicom Resources Limited	**MRIWA Contribution** $655,000 over 4 years

The Challenge

Maximising economically viable co-products and minimising waste resulting from lithium mining and processing operations, within an acceptable regulatory framework.

Proposed Solution

Transforming process routes to convert wastes to useful co-products. These include new soil amelioration materials, supplementary cementitious materials, construction sand and geopolymers, which can all be scaled up massively for the domestic market and potentially create niche products for global markets.

Proposed Benefits to WA

New and innovative waste management strategies to increase the lithium industry's sustainability, reduce the sector's environmental footprint and lower CO_2 emissions while creating new co-products leading to new jobs.

M0533g and M0533h: Cathode precursor production pilot plant in Western Australia - Stages 1 and 2

Downstream Processing Technology

Lead Organisation	Curtin University	**Total Project Value** $3,420,972
Research Contact	Mark Aylmore	
Stage 1 Sponsors	FBI CRC, BASF Corporation, BHP Pty Ltd, Blackstone Minerals Limited, Calix Limited, Cobalt Blue, Covalent Lithium, CSIRO, Galaxy Resources Limited, IGO Limited, JordProxa Pty Ltd, Queensland University of Technology, University of Technology Sydney	**MRIWA Contribution** $450,000 over 4 years

The Challenge

Developing and establishing technical and processing capabilities to manufacture nickel-rich cathode active material precursors at volumes sufficient and validate material quality.

Proposed Solution

A FBI CRC Pilot Plant at CSIRO's Waterford facilities designed to reach outputs providing statistically representative samples to demonstrate appropriate material performance within a reasonable timeframe.

Establishing technical and processing capabilities to produce several hundreds of kg of material with consistent performance characteristics.

Proposed Benefits to WA

The pilot plant will enable WA to not only supply all the commodities required by the battery manufacturing industry, but also develop and demonstrate concept processes for commercial scale precursor production plants within Australia. Increasing opportunity for battery manufacturing in Western Australia creates the potential for the state to become a major processing, manufacturing and trading hub, with the associated social, economic and environmental benefits.

M0533m: Electrochemical testing of Li-ion battery materials in standard cell formats

Data Driven Decisions

Lead Organisation	Institute for Future Environments, Queensland University of Technology	**Total Project Value** $3,724,805
Research Contact	Jose Alarco	
Sponsors	FBI CRC, BASF Corporation, BHP Pty Ltd, Deakin University, IGO Limited, Lava Blue Ltd, University of Melbourne	**MRIWA Contribution** $500,000 over 4 years

The Challenge

In order to be more competitive and participate in the battery supply chain, it is important to be able to demonstrate and validate how Australian lithium-ion battery materials will perform as individual components and when combined in a full cell, to be able to provide representative electrochemical data to validate the performance and quality of these materials.

Proposed Solution

Establishment of a facility for fabricating and electrochemically testing standard lithium-ion battery cells from materials developed in Australia to validate the performance and quality of these materials for producers, and create an accessible database capturing improvements to the battery cell materials for developers.

By providing the necessary infrastructure for validation and iterative development of key Li-ion battery precursor chemicals and materials would enable domestic control of the processes and associated information.

Proposed Benefits to WA

Timely feedback on purity requirements for raw materials as well as material performance data will ensure WA producers are able to meet battery-grade specifications.

The performance data will allow WA producers to optimise commercially competitive characteristics and assist WA to market its minerals to increase global market share and procure preferred supplier status.

M0533r: Demonstrating market advantage through certification and life cycle analysis for Australian battery materials

Data Driven Decisions

Lead Organisation	University of Technology Sydney	**Total Project Value** $2,082,120
Research Contact	Damien Giurco	
Sponsors	FBI CRC, Australasian Pozzolan Association Inc, BASF, BHP Pty Ltd, EU Lithium Institute, Fraunhofer IST, Helmholtz Institute for Resource Technology, IGO Limited, Murdoch University, Multicom Resources, National Institute for Environmental Studies Japan, UTS,University of Melbourne, University of Western Australia	**MRIWA Contribution** $300,000 over 4.5 years

The Challenge

Leading electric vehicle manufacturers are now expecting responsibly sourced materials to be used within their batteries. Currently, the lack of accessible data and a common approach makes it difficult for Australian companies to evidence claims of strong social and environmental performance and to support design for a circular economy.

Proposed Solution

1. Deliver certification pathways for 'responsible sourcing' aligned with international best practice
2. Assemble Australian battery industry datasets and data management framework
3. Deliver an integrated life cycle model for responsible materials supply into a circular economy
4. Benchmark and drive improvements in the social, environmental and carbon footprints of battery materials and by-products
5. Build vision and capability to compete in an era of battery passports.

Proposed Benefits to WA

The WA Future Battery Industry Strategy focuses on 'ethical and sustainable ways'. This FBI CRC project will benefit WA by building capability, credibility and leadership through research connecting government, industry, academics and international experts to support market differentiation and improved performance of Australian materials in sustainable battery supply chains.

Reports Published in 2019-20

M0451: Establishing leaching environmental impact assessment framework (LEAF) tools in the development of a Western Australian framework for by-product re-use and classification

Regulatory Tools and Processes

Lead Organisation	ChemCentre	**Total Project Value** $414,130
Research Contact	Silvia Black	
Sponsors	Alcoa of Australia Limited Aroona Alliance Iluka Resources Limited	**MRIWA Contribution** $144,130 over 2 years

The Challenge

- Large volumes of by-products are produced by mineral processing and related industries in Western Australia every year.
- These materials could represent valuable commodities for construction, landfill and related purposes, but the lack of a formal regulatory process for assessing their environmental impacts prevents their commercial re-use

Key Findings

- This research successfully validated the LEAF (Leaching Environmental Assessment Framework) methodology developed by the US Environmental Protection Agency for use under Western Australian conditions to determine the long-term environmental impacts of industrial by-product re-use.
- An initial database of local Western Australian soils and by-products has been developed for the LEAF modelling tool to allow robust predictions of the environmental impact of proposed or potential by-product uses.

Benefits to WA

- The LEAF tools can provide greater confidence to industry, Government and the community regarding the environmental impacts of by-product use for specific applications in Western Australia.
- This increased confidence will support commercial use of by-product materials In Western Australia, creating the potential for them to become a valuable resource in the local industrial landscape.
- ChemCentre capability will allow expansion of this database as other soil types and materials are tested in the future.

M0498: Wearable technologies for safety

Safety, Social and Environmental Responsibility

Lead Organisation	Soter Analytics	**Total Project Value** $50,000
Research Contact	Matthew Hart	
Sponsors	Roy Hill Holdings Pty Ltd	**MRIWA Contribution** $25,000 over 0.8 years

The Challenge

- Muscular skeletal (MSK) injuries are the most common and costliest type of injury in the resource industry, estimated by DMIRS to cost on average up to $70,000 per injury.
- Existing technology does not adequately manage and reduce the incidence of preventable MSK injuries.

Key Findings

- Development of a new wearable technology and accompanying app to capture and measure data from workers assessing MSK injury risk and factors contributing to MSK pain
- By monitoring and assessing worker's movements, the Soter System technology can communicate actionable real time insights on how MSK injury can be avoided.
- The Soter System allows the risk profile of an entire workforce to be assessed, facilitating adjustment of workplace health and safety mechanisms.

Benefits to WA

- SoterSpine technology allows for enhanced labour productivity, fewer project delays, reduced need for backup labour and reduction in compensation payments for the Western Australian mining industry.
- Acil Allen estimates that implementation of SoterSpine may result in industry cost savings of up to $26.6 million over a ten-year period.

*M0533a: Battery precursor manufacture in Australia - FBI CRC Scene Setting Project**

Downstream Processing Technology

Lead Organisation	Queensland University of Technology	**Total Project Value** $135,000
Research Contact	Peter Talbot	
Sponsors	MRIWA	**MRIWA Contribution** $135,000 over 0.5 years

The Challenge

Australia exports the main commodities used in lithium battery production in the form of mineral concentrates. For Australia to transition into a major processing, manufacturing and trading hub and increase its share of market value from the battery industry, it must take the crucial first step of converting these mineral concentrates into battery precursor materials.

Key Findings

1. An international standard technique for WA manufacture - the 'co-precipitation' technique is identified as the most suitable candidate for cathode active materials (CAM) manufacture.
2. A gradual ramp up of the pilot plant is proposed – a gradual increase in processing capability will allow for development of the technical expertise required to produce high-quality CAM materials.
3. A lab scale/mini plant phase before pilot scale production - to provide validation and reasonable starting values to commence pilot-scale operation.

Benefits to WA

WA is well-placed to develop the battery manufacturing technology central to downstream lithium processing, the critical gap in the Australian supply chain. This will bring significant social, environmental and economic benefits to WA and the nation, placing Australia as an exporter of value-added products, rather than just raw materials.

* Note: Report published 8 July 2020

M0533b: The governance of battery value chains in the Indo-Pacific: Global politics, regional networks and local policy - FBI CRC Scene Setting Project

Strategic Foresight

Lead Organisation	University of Western Australia	**Total Project Value** $89,120
Research Contact	Jeffrey Wilson	
Sponsors	MRIWA	**MRIWA Contribution** $89,120 over 0.5 years

The Challenge

Global demand for batteries is rising rapidly, due to technological transformations in the energy, industrial and transport sectors. Australia is already a major up-stream supplier of battery minerals, and end-user of grid-scale batteries. The challenge is to develop capacity in mid- and down-stream stages of the value chain.

Key Findings

The battery industry offers significant economic opportunities for Australia, with our geological endowments, trusted governance framework and strong international relationships making it an ideal partner for international efforts to develop more resilient battery value chains. This requires:

- A value-chain informed strategy focusing on building mid-stream capacity through international partnerships.
- Domestic efforts to target Australia's mid-stream processing industries, where the most attractive opportunities lie.
- International efforts by governments and businesses to actively pursue international trade, investment and technology partnerships with key global players.

Benefits to WA

As the bulk of value-adding occurs in the mid- and down-stream stages, Australia's economic opportunity lies in leveraging its competitive advantages to 'move along the value chain' from a mining to processing role, as a secure and sustainable partner.

PROGRAM 6: Remediation and Mine Closure

New Projects Approved by the Board in 2019-20

*M0536: Stage 1 Bid development for CRC for Achieveing Sustainable Mine Closure and M0558: CRC for Transitions in Mining Economies (CRC-TiME)**

Sustainable Land Use Post-mining

Lead Organisation	CRC TiME	**Total Project Value** $300,000
Research Contact	Guy Boggs	**MRIWA Contribution** $300,000 over 10 years

The Challenge

Transitioning to a successful future at the end of a mine's life remains a complex and often adversarial challenge, imposing a barrier to engagement between regional businesses, communities, governments and mining companies, all of whom would benefit from an integrated approach to planning mining activity through development, closure and beyond.

Proposed Solution

The Cooperative Research Centre for Transformations in Mining Economies (CRC TiME) will bring together a coalition of industry, service providers, Governments, community and researchers to develop working practices and services that will enable successful transitions of mined land and surrounding communities to resilient post-mine futures. The vision of the CRC is to build a platform for cooperation building opportunity and balancing the risk associated with mine closure and relinquishment.

Proposed Benefits to WA

CRC TiME will improve life-of-mine and rehabilitation planning, providing Western Australian companies with confidence to develop mineral resources. The work of the CRC will also support WA Mining, Equipment, Technology and Service (METS) companies in adopting leading positions in the emerging billion-dollar global market in mine closure and succession.

* Note: name changed during CRC bid process

Current Projects

	Project No	Project Title	Lead Org. and Contact	Sponsors	Duration (yrs)	Total Project Value $	MRIWA Contribution $
Acid Mine Drainage and Treatment of Tailings	M0478	Mine pit lakes – Their characterisation, assessment, management and value as potential lead indicators for in-situ metal recovery opportunities	ChemCentre Silvia Black	CRC for Contamination Assessment and Remediation of the Environment	2	550,000	220,000

	Project No	Project Title	Lead Org. and Contact	Sponsors	Duration (yrs)	Total Project Value $	MRIWA Contribution $
Regulatory Tools and Processes	M0513	Validation and standardisation of sequential leaching tools to better predict the impact of iron ore mining on ground and surface water quality – Phase 2	ChemCentre Silvia Black	BHP Pty Ltd CRC for Contamination Assessment and Remediation of the Environment Fortescue Metals Group Ltd Rio Tinto Limited	2.5	525,000	216,000

Report Published in 2019-20

No Reports Published within this Program Area for the period.

Financial Statements and Notes

Certification of Financial Statements

For the year ended 30 June 2020

The accompanying financial statements of the Minerals Research Institute of Western Australia (MRIWA or the Institute) have been prepared in compliance with the provisions of the *Financial Management Act 2006* (WA) from proper accounts and records to present fairly the financial transactions for the financial year ended 30 June 2020 and the financial position as at 30 June 2020.

At the date of signing we are not aware of any circumstances which would render the particulars included in the financial statements misleading or inaccurate.

Miriam Stanborough
Chairperson of the Board

Date: 17 August 2020

Helen Cook
Deputy Chairperson of the Board

Date: 17 August 2020

Nicole Roocke
Chief Financial Officer

Date: 17 August 2020

Independent Auditor's Report

Auditor General

INDEPENDENT AUDITOR'S REPORT

To the Parliament of Western Australia

MINERALS RESEARCH INSTITUTE OF WESTERN AUSTRALIA

Report on the financial statements

I have audited the financial statements of the Minerals Research Institute of Western Australia which comprise the Statement of Financial Position as at 30 June 2020, the Statement of Comprehensive Income, Statement of Changes in Equity, Statement of Cash Flows for the year then ended, and Notes comprising a summary of significant accounting policies and other explanatory information.

In my opinion, the financial statements are based on proper accounts and present fairly, in all material respects, the operating results and cash flows of the Minerals Research Institute of Western Australia for the year ended 30 June 2020 and the financial position at the end of that period. They are in accordance with Australian Accounting Standards, the *Financial Management Act 2006* and the Treasurer's Instructions.

Basis for opinion
I conducted my audit in accordance with the Australian Auditing Standards. My responsibilities under those standards are further described in the Auditor's Responsibility for the Audit of the Financial Statements section of my report. I am independent of the Institute in accordance with the *Auditor General Act 2006* and the relevant ethical requirements of the Accounting Professional and Ethical Standards Board's APES 110 *Code of Ethics for Professional Accountants* (the Code) that are relevant to my audit of the financial statements. I have also fulfilled my other ethical responsibilities in accordance with the Code. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

Responsibility of the Board for the financial statements
The Board is responsible for keeping proper accounts, and the preparation and fair presentation of the financial statements in accordance with Australian Accounting Standards, the *Financial Management Act 2006* and the Treasurer's Instructions, and for such internal control as the Board determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Board is responsible for assessing the entity's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the Western Australian Government has made policy or funding decisions affecting the continued existence of the Institute.

7th Floor Albert Facey House 469 Wellington Street Perth MAIL TO: Perth BC PO Box 8489 Perth WA 6849 TEL: 08 6557 7500 FAX: 08 6557 7600

Auditor's responsibility for the audit of the financial statements
As required by the *Auditor General Act 2006*, my responsibility is to express an opinion on the financial statements. The objectives of my audit are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes my opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Australian Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of the financial statements.

A further description of my responsibilities for the audit of the financial statements is located on the Auditing and Assurance Standards Board website at https://www.auasb.gov.au/auditors_responsibilities/ar4.pdf. This description forms part of my auditor's report.

Report on controls

Opinion
I have undertaken a reasonable assurance engagement on the design and implementation of controls exercised by the Minerals Research Institute of Western Australia. The controls exercised by the Institute are those policies and procedures established by the Institute to ensure that the receipt, expenditure and investment of money, the acquisition and disposal of property, and the incurring of liabilities have been in accordance with legislative provisions (the overall control objectives).

My opinion has been formed on the basis of the matters outlined in this report.

In my opinion, in all material respects, the controls exercised by the Minerals Research Institute of Western Australia are sufficiently adequate to provide reasonable assurance that the receipt, expenditure and investment of money, the acquisition and disposal of property and the incurring of liabilities have been in accordance with legislative provisions during the year ended 30 June 2020.

The Board's responsibilities
The Board is responsible for designing, implementing and maintaining controls to ensure that the receipt, expenditure and investment of money, the acquisition and disposal of property, and the incurring of liabilities are in accordance with the *Financial Management Act 2006*, the Treasurer's Instructions and other relevant written law.

Auditor General's responsibilities
As required by the *Auditor General Act 2006*, my responsibility as an assurance practitioner is to express an opinion on the suitability of the design of the controls to achieve the overall control objectives and the implementation of the controls as designed. I conducted my engagement in accordance with Standard on Assurance Engagements ASAE 3150 *Assurance Engagements on Controls* issued by the Australian Auditing and Assurance Standards Board. That standard requires that I comply with relevant ethical requirements and plan and perform my procedures to obtain reasonable assurance about whether, in all material respects, the controls are suitably designed to achieve the overall control objectives and were implemented as designed.

Independent Auditor's Report (continued)

An assurance engagement to report on the design and implementation of controls involves performing procedures to obtain evidence about the suitability of the design of controls to achieve the overall control objectives and the implementation of those controls. The procedures selected depend on my judgement, including the assessment of the risks that controls are not suitably designed or implemented as designed. My procedures included testing the implementation of those controls that I consider necessary to achieve the overall control objectives.

I believe that the evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

Limitations of controls
Because of the inherent limitations of any internal control structure, it is possible that, even if the controls are suitably designed and implemented as designed, once the controls are in operation, the overall control objectives may not be achieved so that fraud, error, or noncompliance with laws and regulations may occur and not be detected. Any projection of the outcome of the evaluation of the suitability of the design of controls to future periods is subject to the risk that the controls may become unsuitable because of changes in conditions.

Report on the key performance indicators

Opinion
I have undertaken a reasonable assurance engagement on the key performance indicators of the Minerals Research Institute of Western Australia for the year ended 30 June 2020. The key performance indicators are the Under Treasurer-approved key effectiveness indicators and key efficiency indicators that provide performance information about achieving outcomes and delivering services.

In my opinion, in all material respects, the key performance indicators of the Minerals Research Institute of Western Australia are relevant and appropriate to assist users to assess the Institute's performance and fairly represent indicated performance for the year ended 30 June 2020.

The Board's responsibility for the key performance indicators
The Board is responsible for the preparation and fair presentation of the key performance indicators in accordance with the *Financial Management Act 2006* and the Treasurer's Instructions and for such internal control as the Board determines necessary to enable the preparation of key performance indicators that are free from material misstatement, whether due to fraud or error.

In preparing the performance indicators, the Board is responsible for identifying key performance indicators that are relevant and appropriate, having regard to their purpose in accordance with Treasurer's Instruction 904 *Key Performance Indicators*.

Auditor General's responsibility
As required by the *Auditor General Act 2006*, my responsibility as an assurance practitioner is to express an opinion on the key performance indicators. The objectives of my engagement are to obtain reasonable assurance about whether the key performance indicators are relevant and appropriate to assist users to assess the entity's performance and whether the key performance indicators are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes my opinion. I conducted my engagement in accordance with Standard on Assurance Engagements ASAE 3000 *Assurance Engagements Other than Audits or Reviews of Historical Financial Information* issued by the Australian Auditing and Assurance Standards Board. That standard requires that I comply with relevant ethical requirements relating to assurance engagements.

An assurance engagement involves performing procedures to obtain evidence about the amounts and disclosures in the key performance indicators. It also involves evaluating the relevance and appropriateness of the key performance indicators against the criteria and guidance in Treasurer's Instruction 904 for measuring the extent of outcome achievement and the efficiency of service delivery. The procedures selected depend on my judgement, including the assessment of the risks of material misstatement of the key performance indicators. In making these risk assessments I obtain an understanding of internal control relevant to the engagement in order to design procedures that are appropriate in the circumstances.

I believe that the evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

My independence and quality control relating to the reports on controls and key performance indicators
I have complied with the independence requirements of the *Auditor General Act 2006* and the relevant ethical requirements relating to assurance engagements. In accordance with ASQC 1 *Quality Control for Firms that Perform Audits and Reviews of Financial Reports and Other Financial Information, and Other Assurance Engagements*, the Office of the Auditor General maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Matters relating to the electronic publication of the audited financial statements and key performance indicators
This auditor's report relates to the financial statements and key performance indicators of the Minerals Research Institute of Western Australia for the year ended 30 June 2020 included on the Institute's website. The Institute's management is responsible for the integrity of the Institute's website. This audit does not provide assurance on the integrity of the Institute's website. The auditor's report refers only to the financial statements and key performance indicators described above. It does not provide an opinion on any other information which may have been hyperlinked to/from these financial statements or key performance indicators. If users of the financial statements and key performance indicators are concerned with the inherent risks arising from publication on a website, they are advised to contact the entity to confirm the information contained in the website version of the financial statements and key performance indicators.

SANDRA LABUSCHAGNE
DEPUTY AUDITOR GENERAL
Delegate of the Auditor General for Western Australia
Perth, Western Australia
24 August 2020

Statement of Comprehensive Income

For the year ended 30 June 2020

	Notes	2020 $	2019 $
COST OF SERVICES			
Expenses			
Research grants		6,212,765	3,898,268
Scholarships		309,890	205,424
Employee benefits expense	2.1.1	728,632	587,398
Institute Contractor fees		3,208	132,312
Board and committee fees and costs	2.2	82,633	106,627
Supplies and services	2.3	301,461	414,389
Other expenses	2.3	43,837	96,647
Accommodation expenses		59,250	59,250
Depreciation expense	4.1	2,316	2,894
Total cost of services		**7,743,992**	**5,503,209**
Income			
Revenue & Income			
Interest revenue		128,989	276,093
Other revenue		40,591	33,176
Income from Industry Sponsorship	3.2	2,615,213	2,030,952
Total Revenue & Income		**2,784,793**	**2,340,221**
Total income other than income from State Government		**2,784,793**	**2,340,221**
NET COST OF SERVICES		**4,959,199**	**3,162,988**

	Notes	2020 $	2019 $
Income from State Government	3.1		
State Government Grant		4,297,000	3,128,000
Resources received free of charge		59,250	59,250
Total income from State Government		**4,356,250**	**3,187,250**
SURPLUS/(DEFICIT) FOR THE PERIOD		**(602,949)**	**24,262**
TOTAL COMPREHENSIVE INCOME/(DEFICIT) FOR THE PERIOD		**(602,949)**	**24,262**

The Statement of Comprehensive Income should be read in conjunction with the accompanying notes.

Statement of Financial Position

As at 30 June 2020

	Notes	2020 $	2019 $
ASSETS			
Current Assets			
Cash and cash equivalents	6.1.1	3,674,211	4,445,788
Restricted cash and cash equivalents	6.1.2	9,876,756	8,795,675
Receivables	5.1	854,712	769,918
Other current assets	5.2	19,988	98,167
Total Current Assets		**14,425,667**	**14,109,548**
Non-Current Assets			
Office Equipment	4.1	9,261	11,577
Total Non-Current assets		**9,261**	**11,577**
TOTAL ASSETS		**14,434,928**	**14,121,125**

	Notes	2020 $	2019 $
LIABILITIES			
Current Liabilities			
Payables	5.3	96,437	370,952
Employee benefit provisions	2.1.2	38,046	31,028
Deferred income	5.4	4,245,610	3,079,025
Total Current Liabilities		**4,380,093**	**3,481,005**
Non-Current Liabilities			
Employee benefit provisions	2.1.2	36,131	18,467
Total Non-Current Liabilities		**36,131**	**18,467**
TOTAL LIABILITIES		**4,416,224**	**3,499,472**
NET ASSETS		**10,018,704**	**10,621,653**
EQUITY	8.8		
Accumulated surplus		10,018,704	10,621,653
TOTAL EQUITY		**10,018,704**	**10,621,653**

The Statement of Financial Position should be read in conjunction with the accompanying notes.

Statement of Changes in Equity

For the year ended 30 June 2020

	Notes	Accumulated Surplus $
Balance at 1 July 2018	8.8	10,597,391
Surplus for the period		24,262
Balance at 30 June 2019		**10,621,653**
Balance at 1 July 2019	8.8	10,621,653
Deficit for the period		(602,949)
Balance at 30 June 2020		**10,018,704**

The Statement of Changes in Equity should be read in conjunction with the accompanying notes.

Statement of Cash Flows

For the year ended 30 June 2020

	Notes	2020 $	2019 $
CASH FLOWS FROM STATE GOVERNMENT			
State Government Grant		4,297,000	3,128,000
Net cash provided by State Government		**4,297,000**	**3,128,000**
Utilised as follows:			
CASH FLOWS FROM OPERATING ACTIVITIES			
Payments			
Research Grant Payments		(6,743,562)	(4,196,232)
Employee benefits		(705,029)	(592,976)
Institute Contractor fees		(3,208)	(132,312)
Board and Advisory committee fees		(42,044)	(26,142)
Supplies, Services and Other Expenses		(397,337)	(585,305)
GST paid on purchases		(627,277)	(355,455)
Receipts			
Receipts from Sponsors		3,920,419	2,488,456
Interest received		171,548	279,565
GST received on sales		360,615	155,515
Net GST refunded from ATO (or paid)		78,379	247,570
Net cash used in operating activities		**(3,987,496)**	**(2,717,316)**
Net increase in cash and cash equivalents		309,504	410,684
Cash and cash equivalents at the beginning of the period		13,241,463	12,830,779
CASH AND CASH EQUIVALENTS AT THE END OF THE PERIOD	6.1.1	**13,550,967**	**13,241,463**

The Statement of Cash Flows should be read in conjunction with the accompanying notes.

Notes to the Financial Statements

For the year ended 30 June 2020

Note 1. Basis of preparation

The Institute is a WA Government entity and is controlled by the State of Western Australia, which is the ultimate parent company. The Institute is a not-for-profit entity (as profit is not its principal objective).

A description of the nature of its operations and its principal activities have been included in the 'Overview' and 'Our Projects' sections of the Institute's Annual Report which does not form part of these financial statements.

These annual financial statements were authorised for issue by the Accountable Authority of the Institute on 17 August 2020.

Statement of compliance

These general purpose financial statements are prepared in accordance with:

1) The *Financial Management Act 2006* (WA) **(FMA)**
2) The Treasurer's Instructions **(TIs)**
3) Australian Accounting Standards (**AASs**) - Reduced Disclosure Requirements
4) Where appropriate, those **AAS** paragraphs applicable for not-for-profit entities have been applied.

The *Financial Management Act 2006* (WA) and the Treasurer's Instructions take precedence over AASs. Several AASs are modified by TIs to vary application, disclosure format and wording. Where modification is required and has had a material or significant financial effect upon the reported results, details of that modification and the resulting financial effect are disclosed in the notes to the financial statements.

Basis of preparation

The financial statements are presented in Australian dollars applying the accrual basis of accounting and using the historical cost convention. Certain balances will apply a different measurement basis (such as the fair value basis). Where this is the case the different measurement basis is disclosed in the associated note.

Judgements and estimates

Judgements, estimates and assumptions are required to be made about financial information being presented. The significant judgements and estimates made in the preparation of these financial statements are disclosed in the notes where amounts affected by those judgements and/or estimates are disclosed. Estimates and associated assumptions are based on professional judgements derived from historical experience and various other factors that are believed to be reasonable under the circumstances.

Significant judgements and estimates have been made to meet the requirements of the new standards AASB 15 and AASB 1058.

AASB 15:

Key judgements include determining the timing of revenue from contracts with customers in terms of timing of satisfaction of performance obligations and determining the transaction price and the amounts allocated to performance obligations.

AASB 1058:

Key judgements include determining the timing in the satisfaction of obligations and judgements used in determining whether funds are restricted.

Refer to Note 8.2 for the impact of the initial adoption and the practical expedients applied in the initial recognition.

Note 2. Use of our funding

Expenses incurred in the delivery of services

This section provides the additional information about how the Institute's funding is applied and the accounting policies that are relevant for an understanding of the items recognised in the financial statements. The primary expenses incurred by the Institute in achieving its objectives and the relevant notes are:

	Notes	2020 $	2019 $
Research grants		6,212,765	3,898,268
Scholarships		309,890	205,424
Employee benefits expenses	2.1.1	728,632	587,398
Employee benefits provisions	2.1.2	74,177	49,495
Board and committee fees and costs	2.2	82,633	106,627
Other expenses	2.3	358,152	511,036
Accommodation expenses		59,250	59,250

Research grants expense is recognised when the Institute becomes obliged to make payment to the grantee. The Institute becomes obliged to make payment when the grantee has met the conditions of the grant agreement, normally on a quarterly basis.

Scholarship expense represents the Institute's obligation to fund approved scholarships.

Accommodation expense represents the Institute's rental expense.

2.1.1 Employee benefits expenses

	2020 $	2019 $
Wages and salaries	657,156	532,534
Superannuation - defined contribution plans[(a)]	71,476	54,864
	728,632	**587,398**

(a) Defined contribution plans include West State Superannuation Scheme (WSS), Gold State Superannuation Scheme (GSS), Government Employees Superannuation Board Schemes (GESBs) and other eligible funds.

Wages and salaries: Employee expenses include all costs related to employment including wages and salaries, and leave entitlements.

Superannuation: The amount recognised in profit or loss of the Statement of Comprehensive Income comprises employer contributions paid to the GSS (concurrent contributions), the WSS Scheme, the GESBs or other superannuation funds.

2.1.2 Employee related provisions

Provision is made for benefits accruing to employees in respect of wages and salaries, annual leave and long service leave for services rendered up to the reporting date and recorded as an expense during the period the services are delivered.

	2020 $	2019 $
Current		
Employee benefits provision		
Annual leave[(a)]	38,046	14,127
Long service leave[(b)]	-	16,901
	38,046	**31,028**
Non-Current		
Employee benefits provision		
Long service leave[(c)]	36,131	18,467
	36,131	**18,467**

(a) **Annual leave liabilities:** Classified as current as there is no unconditional right to defer settlement for at least 12 months after the reporting period.

The provision for annual leave is calculated at the present value of expected payments to be made in relation to services provided by employees up to the reporting date.

(b) **Long service leave liabilities**: Unconditional long service leave provisions are classified as **current** liabilities as the Institute does not have an unconditional right to defer settlement of the liability for at least 12 months after the end of the reporting period.

(c) Pre-conditional and conditional long service leave provisions are classified as **non-current** liabilities because the Institute has an unconditional right to defer the settlement of the liability until the employee has completed the requisite years of service.

The provision for long service leave is calculated at present value as the Institute does not expect to wholly settle the amounts within 12 months. The present value is measured taking into account the present value of expected future payments to be made in relation to services provided by employees up to the reporting date. These payments are estimated using the remuneration rate expected to apply at the time of settlement, and discounted using market yields at the end of the reporting period on national government bonds with terms to maturity that match, as closely as possible, the estimated future cash outflows.

Key sources of estimation uncertainty – long service leave
Key estimates and assumptions concerning the future are based on historical experience and various other factors that have a significant risk of causing a material adjustment to the carrying amount of assets and liabilities within the next financial year.

Several estimates and assumptions are used in calculating the Agency's long service leave provision. These include:

- Expected future salary rates
- Discount rates
- Employee retention rates; and
- Expected future payments

Changes in these estimations and assumptions may impact on the carrying amount of the long service leave provision. Any gain or loss following revaluation of the present value of long service leave liabilities is recognised as employee benefits expense.

2.2 Board and committee fees and costs

	2020 $	2019 $
Board of Directors' remuneration	77,232	83,582
Advisory Committee attendance fees	3,917	15,439
Board and Advisory Committee's expenses	1,484	7,606
	82,633	**106,627**

2.3 Other expenditure

	2020 $	2019 $
Supplies and services		
Printing and stationery	2,807	1,133
Advertising	1,855	-
Communications	49,331	26,710
Business travel	10,097	11,985
Accounting services	101,780	131,870
Consultants	83,798	165,952
Legal services	16,553	23,598
Insurance	11,692	6,043
Sponsorships	-	5,599
Other	23,548	41,499
Total supplies and services	**301,461**	**414,389**
Other expenses		
Audit fees	19,184	18,900
Loss allowance	-	22,000
Employee expenses	19,626	39,206
Employee on-costs	5,027	11,524
Office fit out	-	5,017
	43,837	**96,647**
Total other expenses	**358,152**	**511,036**

Supplies and services: Supplies and services are recognised as an expense in the reporting period in which they are incurred.

Other expenses: Other expenditures generally represent the day-to-day running costs incurred in normal operations.

Loss allowance: A loss allowance was recognised as the movement in the allowance for doubtful debts.

Employee on-costs: Includes workers' compensation insurance. Superannuation contributions accrued as part of the provision for leave are employee benefits and are not included in employment on-costs.

Note 3. Our funding sources

How we obtain our funding

This section provides additional information about how the Institute obtains its funding and the relevant accounting policy notes that govern the recognition and measurement of this funding. The primary income received by the Institute and the relevant notes are:

	Notes	2020 $	2019 $
Income from State Government	3.1	4,356,250	3,187,250

3.1 Income from State Government

	2020 $	2019 $
State Government Grants	4,297,000	3,128,000
	4,297,000	**3,128,000**

Services received free of charge from other State Government agencies during the period:

	2020 $	2019 $
Department of Mines, Industry Regulation and Safety	59,250	59,250
	59,250	**59,250**
	4,356,250	**3,187,250**

State Government Grant: Revenue is recognised at fair value when MRIWA obtains control over the assets comprising the contributions, usually when cash is received.

Resources received free of charge or for nominal cost: Resources received free of charge or for nominal cost that MRIWA would otherwise purchase if not donated, are recognised as income at fair value where they can be reliably measured. A corresponding expense is recognised for services received. Receipts of assets are recognised in the Statement of Financial Position.

Resources received from other State Government agencies are separately disclosed under Income from State Government in the Statement of Comprehensive Income.

3.2 Income from Industry Sponsorship

	2020 $	2019 $
Sponsorship income	2,615,213	2,030,952

Income from Industry Sponsorship: MRIWA provides a service to sponsors by administering sponsorship funds for research projects. This service is completed under a contractual arrangement. Income from sponsors is recognised at the point in time MRIWA has completed this service and there are no return obligations to the sponsor.

Note 4. Key assets

Assets the Institute utilises for economic benefit or service potential

This section includes information regarding the key assets the Institute utilises to gain economic benefits or provide service potential. The section sets out both the key accounting policies and financial information about the performance of these assets:

	Notes	2020 $	2019 $
Office equipment	4.1	9,261	11,577

4.1 Office Equipment

	2020 $	2019 $
Office equipment		
At cost	33,480	33,480
Accumulated depreciation	(24,219)	(21,903)
	9,261	**11,577**
Office equipment		
Carrying amount at start of period	11,577	14,471
Depreciation	(2,316)	(2,894)
Carrying amount at end of period	**9,261**	**11,577**

Initial recognition

Items of plant and equipment costing $5,000 or more are recognised initially at cost. Where an asset is acquired for no or nominal cost, the cost is valued at its fair value at the date of acquisition. Items of plant and equipment costing less than $5,000 are immediately expensed direct to the Statement of Comprehensive Income (other than where they form part of a group of similar items which are significant in total).

Subsequent measurement

All plant and equipment is stated at historical cost less accumulated depreciation and accumulated impairment losses.

Depreciation

All plant and equipment having a limited useful life are systematically depreciated over their estimated useful lives in a manner that reflects the consumption of their future economic benefits.

Depreciation is generally calculated on a straight-line basis, at rates that allocate the asset's value, less any estimated residual value, over its estimated useful life. The expected useful life for plant and equipment is 3 to 7 years.

The estimated useful lives, residual values and depreciation method are reviewed at the end of each annual reporting period, and adjustments are made where appropriate.

Impairment

Non-financial assets, including items of plant and equipment, are tested for impairment whenever there is an indication that the assets may be impaired. Where there is an indication of impairment, the recoverable amount is estimated at the higher of fair value less costs of disposal and value in use. Where the recoverable amount is less than the carrying amount, the asset is considered impaired and is written down to the recoverable amount and an impairment loss is recognised.

Where an asset measured at cost is written down to its recoverable amount, an impairment loss is recognised through profit or loss.

As the Institute is a not-for-profit institute, the recoverable amount of regularly revalued specialised assets is anticipated to be materially the same as fair value.

If there is an indication that there has been a reversal in impairment, the carrying amount shall be increased to its recoverable amount. However, this reversal should not increase the asset's carrying amount above what would have been determined, net of depreciation or amortisation, if no impairment loss has been recognised in prior years.

The risk of impairment is generally limited to circumstances where an asset's depreciation is materially understated, where the replacement cost is falling or where there is a significant change in useful life. Each relevant class of assets is reviewed annually to verify that the accumulated depreciation/amortisation reflects the level of consumption or expiration of the asset's future economic benefits and to evaluate any impairment risk from declining replacement costs.

Note 5. Other assets and liabilities

This section sets out those assets and liabilities that arose from the Institute's controlled operations and includes other assets utilised for economic benefits and liabilities incurred during normal operations:

	Notes	2020 $	2019 $
Receivables	5.1	854,712	769,918
Other current assets	5.2	19,988	98,167
Payables	5.3	96,437	370,952
Deferred income	5.4	4,245,610	3,079,025

5.1 Receivables

	2020 $	2019 $
Current		
Grant Receivables - Sponsorship	562,438	723,058
Less: provision for doubtful debts	-	(22,000)
	562,438	701,058
GST receivable	292,274	68,860
	854,712	**769,918**

Trade receivables are recognised at original invoice amount less an allowance for any uncollectible amounts (i.e. expected credit loss). The collectability of receivables is reviewed on an ongoing basis and any receivables identified as uncollectible are written off against the allowance account. In the current year no expected credit loss was recognised. The carrying amount is equivalent to fair value as it is due for settlement within 30 days.

5.2 Other current assets

	2020 $	2019 $
Accrued Interest	19,013	61,572
Prepayments	975	1,464
Other receivables	-	35,131
	19,988	**98,167**

Revenue is recognised when the interest accrues.

5.3 Payables

	2020 $	2019 $
Current		
Research grants payable	6,344	66,000
Scholarships payable	40,000	-
Accrued research grants	-	201,250
Accrued general expenses	43,767	101,749
Accrued salaries	6,326	1,953
	96,437	**370,952**

All Payables are recognised when MRIWA becomes obliged to make future payments as a result of a purchase of assets or services. The carrying amount is equivalent to fair value, as they are generally settled within 30 days.

Accrued salaries represent the amount due to staff but unpaid at the end of the financial year. Accrued salaries are settled within a fortnight of the financial year end.

Accrued research grants & general expenses represent the amounts due to researchers and suppliers but unpaid at the end of the financial year. These payments are settled within 30 days of the financial year end. MRIWA considers the carrying amount of accrued expenses to be equivalent to its fair value.

5.4 Deferred Income

	2020 $	2019 $
Deferred Income - Sponsorship	4,245,610	3,079,025
	4,245,610	**3,079,025**

Deferred Income is recognised when the sponsorship funds are received or receivable and the Institute has not fulfilled its obligations under the terms of the sponsorship agreement. Refer to Note 3.2.

Note 6. Financing

This section sets out the material balances and disclosures associated with the financing and cash flows of the Institute.

	Notes	2020 $	2019 $
Cash and cash equivalents	6.1.1	3,674,211	4,445,788
Restricted cash and cash equivalents	6.1.2	9,876,756	8,795,675
Commitments	6.2	10,702,566	6,377,797

6.1 Cash and cash equivalents

6.1.1 Reconciliation of cash

	2020 $	2019 $
Cash and cash equivalents	3,674,211	4,445,788
Restricted cash and cash equivalents - current	9,876,756	8,795,675
	13,550,967	**13,241,463**

For the purpose of the Statement of Cash Flows, cash and cash equivalents (and restricted cash and cash equivalents) assets comprise cash on hand and short-term deposits with original maturities of three months or less that are readily convertible to a known amount of cash and which are subject to insignificant risk of changes in value.

6.1.2 *Restricted cash and cash equivalents*

	2020 $	2019 $
Research grants	9,521,278	8,311,741
Scholarships	355,478	483,934
	9,876,756	**8,795,675**

Cash held in the account is to be used only for the purpose of providing grants for research and development of projects to grantees

6.2 Commitments

	2020 $	2019 $
Other expenditure commitments		
Within 1 year	5,594,766	2,890,888
Later than 1 year and not later than 5 years	4,907,800	3,186,909
Later than 5 years	200,000	300,000
	10,702,566	**6,377,797**

The total presented for other expenditure commitments are GST exclusive.

The total commitments reported above represent only projects with completed contractual liabilities in place. MRIWA has committed additional monies to research projects during this period. The contracts for these projects are still to be finalised. These monies have not been included in the amounts reflected above.

Note 7. Financial instruments and contingencies

This note sets out the key risk management policies and measurement techniques of the Institute.

	Notes
Financial Instruments	7.1
Contingent Liabilities and Assets	7.2

7.1 Financial instruments

The carrying amounts of each of the following categories of financial assets and financial liabilities at the end of the reporting period are:

	2020 $	2019 $
Financial assets		
Cash and cash equivalents	3,674,211	4,445,788
Restricted cash and cash equivalents	9,876,756	8,795,675
Receivables[(a)]	562,438	701,058
Other current assets	19,013	98,167
Total financial assets	**14,132,418**	**14,040,688**
Financial liabilities		
Liabilities measured at amortised cost	96,437	370,952
Total financial liability	**96,437**	**370,952**

(a) The amount of receivables/financial assets at amortised cost excludes GST recoverable from the ATO (statutory receivable).

7.2 Contingent assets and liabilities

MRIWA has no contingent liabilities or contingent assets.

Note 8. Other disclosures

This section includes additional material disclosures required by accounting standards or other pronouncements, for the understanding of this financial report.

	Notes
Events occurring after the end of the reporting period	8.1
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8.1 Events occurring after the end of the reporting period

MRIWA has had no events occurring after the end of the reporting period.

8.2 Initial application of Australian Accounting Standards

(a) AASB 15 Revenue from Contract with Customers and AASB 1058 Income of Not-for-Profit Entities

AASB 15 Revenue from Contracts with Customers replaces AASB 118 Revenue and AASB 111 Construction Contracts for annual reporting periods on or after 1 July 2019. Under the new model, MRIWA shall recognise revenue when (or as) the entity satisfies a performance obligation by transferring a promised good or service and is based upon the transfer of control rather than transfer of risks and rewards.

AASB 15 focuses on providing sufficient information to the users of financial statements about the nature, amount, timing and uncertainty of revenue and cash flows arising from the contracts with customers. Revenue is recognised by applying the following five steps:

- Identifying contracts with customers
- Identifying separate performance obligations
- Determining the transaction price of the contract
- Allocating the transaction price to each of the performance obligations
- Recognising revenue as each performance obligation is satisfied.

Revenue is recognised either over time or at a point in time. Any distinct goods or services are separately identified and any discounts or rebates in the contract price are allocated to the separate elements.

In addition, the agency derives income from appropriations which are recognised under AASB 1058. AASB 1058 is applied to Not-for-Profit Entities for recognising income that is not revenue from contracts with customers. Timing of income recognition under AASB 1058 depends on whether such a transaction gives rise to a liability or other performance obligation (a promise to transfer a good or service), or a contribution by owners, related to an asset (such as cash or another asset) recognised by an agency.

MRIWA will adopt the modified retrospective approach on transition to AASB 15 and AASB 1058. No comparative information will be restated under this approach, and MRIWA will recognise the cumulative effect of initially applying the standard as an adjustment to the opening balance of accumulated surplus/(deficit) at the date of initial application if any adjustments are required.

Refer to Note 3.2 for the income accounting policy adopted from 1 July 2019.

(b) AASB 16 Leases

From 1 January 2019, AASB 16 Leases supersedes AASB 117 Leases, Interpretation 4 Determining whether an Arrangement contains a Lease, Interpretation 115 Operating Leases – Incentives, and Interpretation 127 Evaluating the Substance of Transactions Involving the Legal Form of a Lease. AASB 16 primarily affects lessee accounting and provides a comprehensive model for the identification of lease arrangements and their treatment in the financial statements of both lessees and lessors.

The main changes introduced by the new Standard include identification of a lease within a contract and a new lease accounting model for lessees that requires lessees to recognise all leases (operating and finance leases) on the Statement of Financial Position as a right-of-use asset and lease liability, except for short term leases (lease terms of 12 months or less at commencement date) and low-value assets (valued less than $5,000). The operating lease and finance lease distinction for lessees no longer exists.

MRIWA has applied the modified retrospective approach on initial adoption. As permitted under the specific transition provisions in the standard, comparatives have not been restated. As there has been no impact on the initial adoption of the standard MRIWA has not applied practical expedients nor adjusted the opening balance of retained earnings.

8.3 Key management personnel

The Institute has determined key management personnel include the responsible Minister, board members, and senior officers of the Authority.

The Institute does not incur expenditures to compensate Ministers and those disclosures may be found in the *Annual Report on State Finances.*

The total fees, salaries, superannuation, non-monetary benefits and other benefits for senior officers of the Institute for the reporting period are presented within the following bands:

	2020	2019
Compensation band ($)		
0 – 10,000	1	1
10,000 – 20,000	6	5
20,000 – 30,000	-	1
150,000 – 160,000	-	1
180,000 – 200,000	-	1
250,000 – 300,000	1	-

	2020 $	2019 $
Total compensation of senior officers	**375,216**	**440,230**[(a)]

(a) MRIWA's inaugural Chief Executive Officer moved to Other Duties in November 2018 and retired from the organisation in May 2019 after a period of long service leave. The new CEO commenced in November 2018.

Total compensation includes the superannuation expense incurred by the Institute in respect of senior officers.

8.4 Related party transactions

The Institute is a wholly owned and controlled entity of the State of Western Australia. In conducting its activities, the Institute is required to pay various taxes and levies based on the standard terms and conditions that apply to all tax and levy payers to the State and entities related to State.

Related parties of the Institute include:

- all Ministers and their close family members, and their controlled or jointly controlled entities;
- all senior officers and their close family members, and their controlled or jointly controlled entities;
- the Government Employees Superannuation Board (GESB);
- other departments and public sector entities, including related bodies included in the whole of government consolidated financial statements; and
- associates and joint ventures that are included in the whole of government consolidated financial statements.

Significant transactions with related parties throughout the year ended 30 June 2020 include:

- Department of Mines, Industry Regulation and Safety
  - Appropriations (refer note 3.1)
  - Accommodation received free of charge (included in Accommodation Expense and Resources Received Free of Charge (refer note 3.1)
- ChemCentre
  - Sponsorships of research projects (included within Income from Industry Sponsorship, the value of $233,363)
- Department of Jobs, Tourism, Science and Innovation
  - Funds received under a Memorandum of Understanding for allocation to the Future Battery Industries Cooperative Research Centre (FBI CRC) ($150,000)

8.5 Related bodies

The Institute has no related bodies.

8.6 Affiliated bodies

The Institute has no affiliated bodies.

8.7 Remuneration of auditors

Remuneration paid or payable to the Auditor General in respect of the audit for the current financial year is as follows:

	2020 $	2019 $
Auditing the accounts, financial statements and key performance indicators	19,184	19,184

8.8 Equity

The Western Australian Government holds the equity interest in MRIWA on behalf of the community. Equity represents the residual interest in the net assets of MRIWA.

	2020 $	2019 $
Accumulated surplus		
Balance at start of period	10,621,653	10,597,391
Result for the period	(602,949)	24,262
Balance at end of period	**10,018,704**	**10,621,653**
Total Equity at end of period	**10,018,704**	**10,621,653**

8.9 Supplementary financial information

(a) Write-offs

	2020 $	2019 $
Public property written-off by the Authority during the period	-	-
	-	-

(b) There were no losses through theft, defaults and other causes.

(c) No gifts of public property were provided by the Institute.

8.10 Explanatory statement

All variances between estimates (original budget) and actual results for 2020, and between the actual results for 2020 and 2019 are shown below. Narratives are provided for key variations selected from observed major variances, which are generally greater than 10% and $1,000,000.

Statement of Comprehensive Income

	Variance note	Original budget 2020 $	Actual 2020 $	Actual 2019 $	Variance between estimate and actual $	Variance between actual results for 2020 and 2019 $
COST OF SERVICES						
Expenses						
Research grants	1, A	8,800,776	6,212,765	3,898,268	(2,588,011)	2,314,497
Scholarships		320,174	309,890	205,424	(10,284)	104,466
Employee benefits expense		780,775	728,632	587,398	(52,143)	141,234
Institute Contractor fees		50,000	3,208	132,312	(46,792)	(129,104)
Board and committee fees and costs		117,202	82,633	106,627	(34,569)	(23,994)
Supplies and services		410,586	301,461	414,389	(109,125)	(112,928)
Other expenses		19,380	43,837	96,647	24,457	(52,810)
Accommodation expense		47,250	59,250	59,250	12,000	-
Depreciation expense		3,870	2,316	2,894	(1,554)	(578)
Total cost of services		**10,550,013**	**7,743,992**	**5,503,209**	**(2,806,021)**	**2,240,783**

8.10 Explanatory statement (continued)

Statement of Comprehensive Income (continued)

	Variance note	Original budget 2020 $	Actual 2020 $	Actual 2019 $	Variance between estimate and actual $	Variance between actual results for 2020 and 2019 $
Income						
Revenue						
Interest revenue		200,000	128,989	276,093	(71,011)	(147,104)
Other revenue		41,462	40,591	33,176	(871)	7,415
Income from Industry Sponsorship	2	5,359,680	2,615,213	2,030,952	(2,744,467)	584,261
Total Revenue		**5,601,142**	**2,784,793**	**2,340,221**	**(2,816,349)**	**444,572**
Total income other than income from State Government		**5,601,142**	**2,784,793**	**2,340,221**	**(2,816,349)**	**444,572**
						-
NET COST OF SERVICES		**(4,948,871)**	**(4,959,199)**	**(3,162,988)**	**(10,328)**	**(1,796,211)**
						-
Income from State Government						-
State Government Grant	B	4,147,000	4,297,000	3,128,000	150,000	1,169,000
Resources received free of charge		47,250	59,250	59,250	12,000	-
Total income from State Government		**4,194,250**	**4,356,250**	**3,187,250**	**162,000**	**1,169,000**
SURPLUS/(DEFICIT) FOR THE PERIOD		**(754,621)**	**(602,949)**	**24,262**	**151,672**	**(627,211)**
						-
TOTAL COMPREHENSIVE INCOME FOR THE PERIOD		**(754,261)**	**(602,949)**	**24,262**	**151,672**	**(627,211)**

8.10 Explanatory statement (continued)

Statement of Comprehensive Income (continued)

Major Estimate and Actual (2020) Variance Narratives

1. Research grants are below estimate as payments to researchers are a function of:
   - the number and financial scale of applications submitted to MRIWA;
   - the time required to negotiate the Conditions of Grant for a project with the sponsors and research partners; and
   - progress by the researchers in executing the project and the timeliness of researchers' submission of their progress reports and financial statements in order to receive the next claim.

   Payments to researchers will differ from year to year based on the progress of the research.

2. Income from industry sponsorship is below estimate as it is difficult to forecast an accurate value of industry sponsorship income for new research projects. Revenue from industry sponsorship is also impacted by decisions of sponsors to pay funds direct to researchers, rather than MRIWA, for projects forecast to be approved throughout the financial year.

Major Actual (2020) and Comparative (2019) Variance Narratives

A. Research grants expenditure has increased from the prior year as more projects progressed in their research during this financial year, resulting in eligible researcher payments made. The number and/or value of projects committed to also increased from the prior year.

B. Increase in state government grant income from the prior year is a result of additional funding for the FBI CRC.

8.10 Explanatory statement (continued)

Statement of Financial Position

	Variance note	Original budget 2020 $	Actual 2020 $	Actual 2019 $	Variance between estimate and actual $	Variance between actual results for 2020 and 2019 $
ASSETS						
Current Assets						
Cash and cash equivalents		2,478,373	3,674,211	4,445,788	1,195,838	(771,577)
Restricted cash and cash equivalents		9,913,490	9,876,756	8,795,675	(36,734)	1,081,081
Receivables and other assets		579,766	854,712	769,918	274,946	84,794
Other current assets		50,000	19,988	98,167	(30,012)	(78,179)
Total Current Assets		**13,021,629**	**14,425,667**	**14,109,548**	**1,404,038**	**316,119**
Non-Current Assets						
Office equipment		13,580	9,261	11,577	(4,319)	(2,316)
Total Non-Current Assets		**13,580**	**9,261**	**11,577**	**(4,319)**	**(2,316)**
TOTAL ASSETS		**13,035,209**	**14,434,928**	**14,121,125**	**1,399,719**	**313,803**

8.10 Explanatory statement (continued)

Statement of Financial Position (continued)

	Variance note	Original budget 2020 $	Actual 2020 $	Actual 2019 $	Variance between estimate and actual $	Variance between actual results for 2020 and 2019 $
LIABILITIES						
Current Liabilities						
Payables		1,101,074	96,437	370,952	(1,004,637)	(274,515)
Provisions		69,304	38,046	31,028	(31,258)	7,018
Deferred income	1, A	2,900,000	4,245,610	3,079,025	1,345,610	1,166,585
Total Current Liabilities		**4,070,377**	**4,380,093**	**3,481,005**	**309,716**	**899,088**
Non-Current Liabilities						
Provisions		-	36,131	18,467	36,131	17,664
Total Non-Current Liabilities		-	36,131	18,467	36,131	17,664
TOTAL LIABILITIES		**4,070,377**	**4,416,224**	**3,499,472**	**345,847**	**916,752**
NET ASSETS		**8,964,832**	**10,018,704**	**10,621,653**	**1,053,872**	**(602,949)**
EQUITY						
Accumulated surplus		8,964,832	10,018,704	10,621,653	1,053,872	(602,949)
TOTAL EQUITY		**8,964,832**	**10,018,704**	**10,621,653**	**1,053,872**	**(602,949)**

8.10 Explanatory statement (continued)

Statement of Financial Position (continued)

Major Estimate and Actual (2020) Variance Narratives

1. Deferred income is above estimate due to difficulty in forecasting an accurate value of deferred revenue as it is determined by the individual sponsorship value of each project and the timing of cash received, additionally it is affected by the delays in executing the Conditions of Grant for projects.

Major Actual (2020) and Comparative (2019) Variance Narratives

A. Deferred revenue has increased from prior years as projects that had Conditions of Grant not yet finalised at the end of 2018-19 had negotiations concluded and research commence in this financial year. The income received from sponsors have a direct relationship to the deferred revenue calculated.

8.10 Explanatory statement (continued)

Statement of Cash Flows

	Variance note	Original budget 2020 $	Actual 2020 $	Actual 2019 $	Variance between estimate and actual $	Variance between actual results for 2020 and 2019 $
CASH FLOWS FROM STATE GOVERNMENT						
State Government Grant						
Net cash provided by State Government	A	4,147,000	4,297,000	3,128,000	150,000	1,169,000
		4,147,000	**4,275,000**	**3,128,000**	**150,000**	**1,169,000**
Utilised as follows:						
CASH FLOWS FROM OPERATING ACTIVITIES						
Payments						
Research Grant Payments	1, B	(8,541,184)	(6,743,562)	(4,196,232)	1,797,622	(2,547,330)
Employee benefits		(780,775)	(705,029)	(592,976)	(75,746)	(112,053)
Institute Contractor fees		(50,000)	(3,208)	(132,312)	(46,792)	129,104
Board and Advisory committee fees		(65,572)	(42,044)	(26,142)	(23,528)	(15,902)
Supplies and Services		(429,966)	(397,337)	(585,305)	(32,629)	187,968
GST payments on purchases		(902,115)	(627,277)	(355,455)	274,838	(271,822)

8.10 Explanatory statement (continued)

Statement of Cash Flows (continued)

	Variance note	Original budget 2020 $	Actual 2020 $	Actual 2019 $	Variance between estimate and actual $	Variance between actual results for 2020 and 2019 $
Receipts						
Receipts from Sponsors	C	4,779,914	3,920,419	2,488,456	859,495	1,431,963
Interest received		206,000	171,548	279,565	(34,452)	(108,017)
GST receipts on sales		477,991	360,615	155,515	117,376	205,100
GST receipts from taxation authority		424,124	78,379	247,570	345,745	(169,191)
Net cash used in operating activities		**(4,881,583)**	**(3,987,496)**	**(2,717,316)**	**894,087**	**(1,270,180)**
Net increase/(decrease) in cash and cash equivalents		(734,583)	309,504	410,684	1,044,087	(101,180)
Cash and cash equivalents at the beginning of the period		13,126,446	13,241,463	12,830,779	115,017	410,684
CASH AND CASH EQUIVALENTS AT THE END OF THE PERIOD		**12,391,863**	**13,550,967**	**13,241,463**	**1,159,104**	**309,504**

8.10 Explanatory statement (continued)

Statement of Cash Flows (continued)

Major Estimate and Actual (2020) Variance Narratives

1. Research grants are below estimate as payments to researchers are a function of:
   - the number and financial scale of applications submitted to MRIWA;
   - the time required to negotiate the condition of grant for a project with the sponsors and research partners; and
   - progress by the researchers in executing the project and the timeliness of researchers' submission of their progress reports and financial statements in order to receive the next claim.

   Payments to researchers will differ from year to year based on the progress of the research.

Major Actual (2020) and Comparative (2019) Variance Narratives

A. Net cash provided by State Government has increased from the prior year due to additional funding received during the year.

B. Research grant payments have increased from the prior year as more projects progressed in their research during this financial year, resulting in eligible researcher payments made.

C. Receipts from sponsors are driven by the terms set in the Conditions of Grant at the commencement of every new research project. The increase in receipts indicates more research projects have progressed according to their project timeline.

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Our Governance

MRIWA's robust governance and contemporary fit-for-purpose corporate practices are outlined in this section highlighting some of the mechanisms in place to improve our performance, deliver business outcomes and ensure compliance.

Message from the Audit and Risk Committee Chair

In addition to its role in leading the financial reporting and audit process for MRIWA, the Audit and Risk Committee oversaw significant improvements in our financial and performance reporting and risk management systems and controls during this year. This has followed establishment of governance as a strategic pillar in 2018/19 as reported last year.

Deloitte commenced as our Financial Services provider from 1 August 2019 in keeping with the arrangement of exemption from TI 824 and to ensure the appropriate level of financial support is provided to the organisation.

The Audit and Risk Committee conducted a risk statement review and update, a code of conduct review and update, and also provided oversight of the implementation of a number of new processes and polices as a result of the finalised business process review. This included establishment of a policy framework, introduction of a policy on data and data repositories and a record keeping plan review.

A major activity of the year was progress on establishing a fit-for-purpose IT security implementation plan, infrastructure upgrade and transition to Cloud. This program was quickly accelerated to meet working from home requirements during the COVID response during the last quarter.

The upgrade of MRIWA's MAPS system continued to C-MAPS (in the cloud) and is due for completion in the next quarter further improving this core business system towards a cost effective, responsive, fit for purpose software solution to support the Institute's activities.

In addition, the Audit and Risk Committee continued review of recent and emerging accounting standards changes to ensure compliance and prepared for the state supply commission procurement audit due later in 2020.

The Audit and Risk Committee also updated its Charter and formalised and aligned its internal audit plan and focus this year to the updated requirements for WA government entities.

I would like to again acknowledge the work of my Audit and Risk Committee members Larry Lopez and Mark Bush and thank them for their continued valuable contribution, our CEO Nicole Roocke and Stephanie Ahlfeld from MRIWA together with Peter Reynolds from Deloitte. I would also like to acknowledge Anil Subramanya who left in early 2020.

Helen Cook
Chair
Audit and Risk Committee

Committee Structure and Decision-Making Framework

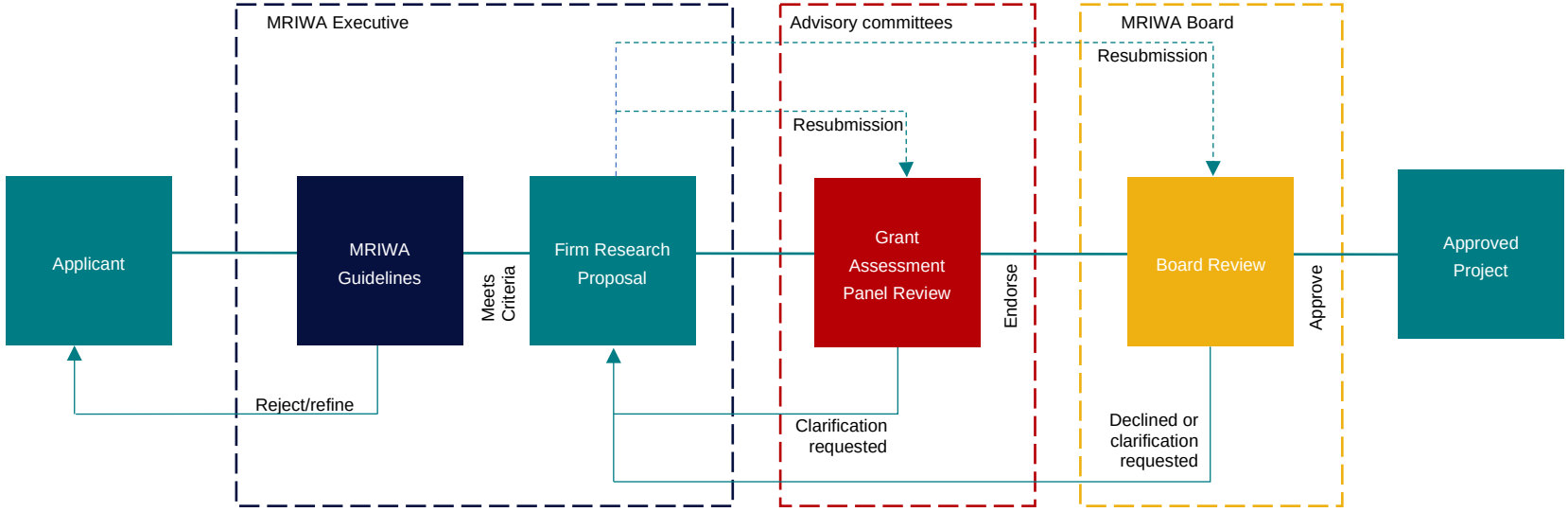
MRIWA reviewed its grants administration processes and assessment criteria throughout 2019-20, resulting in an approach which streamlines decision making while ensuring research investment decisions are focused on those areas which will deliver impact to Western Australia.

Control and management of MRIWA is vested in a Board of seven members (MRIWA Board), who are appointed by the Minister. The CEO administers the day-to-day operations, subject to the direction of the MRIWA Board.

The MRIWA College is an advisory group appointed by the MRIWA Board to provide advice to MRIWA and the MRIWA Board on minerals research priorities and assist in the assessment of research grant applications which seek to address the challenges facing the State's minerals industry to ensure it can deliver an economic and social benefit for Western Australia.

Representatives on the MRIWA College are drawn from industry, the research community and government organisations with specific knowledge and experience relevant to one or more of the program areas in the MRIWA Research Priority Plan.[1]

Research applications are developed by an Applicant with input from MRIWA, before being reviewed by a Grant Assessment Panel (GAP). Members of the GAP are drawn from the MRIWA College. The GAP make a recommendation to the MRIWA Board on each project. It is the role of the MRIWA Board to approve investment decisions in specific projects.



1. https://www.mriwa.wa.gov.au/research-funding/research-priorities/

Disclosures

Shared Responsibilities with Other Agencies

The Institute did not share any responsibilities with any other agencies in 2019-20.

Ministerial Directives

There have been no Ministerial directives to MRIWA in 2019-20.

Other Financial Disclosures

Capital Works

MRIWA has no capital works projects.

Employment and Industrial Relations

As of 30 June 2020, MRIWA employed 5 people, equating to 5 full-time equivalents (FTE).

During the year 1 person ceased employment with MRIWA.

MRIWA employment profile

Employment Type	2018-19	2019-20
Fixed Term Full-Time	2	2
Fixed Term Part-Time	1	0

Staff Development

MRIWA is committed to supporting its employees through the provision of training and development opportunities.

Diversity Profile

Diversity Group	2018-19	2019-20
Women on the Board	57%	57%
Women in Senior Executive Services (SES)	100%	100%
Indigenous Australians	0	0
Employees from Culturally-Diverse Background	33%	0
Employees with Disabilities	0	0
Youth (under 25 years)	0	0

Occupational Safety & Health; Workers Compensation and Injury Management

MRIWA is committed to providing a safe work environment. OHS policies and procedures are directly linked to the MRIWA Risk Register as the control mechanism for reducing the risk of injury of employees, students and visitors. All risks and controls are reviewed annually.

During 2019-20 there were no Workers Compensation claims lodged and there are no employees on return to work plans.

Unauthorised use of credit cards

Officers of MRIWA hold corporate credit cards where their functions warrant usage of this facility.

There was no unauthorised use of credit cards during the period.

Governance Disclosures

Advertising

In accordance with section 175ZE of the *Electoral Act 1907* (WA), MRIWA has not incurred any expenditure for advertising agencies, market research, polling, direct mail or media advertising agencies.

Board and Committee Representation

To achieve its objective, MRIWA draws substantially on members of the minerals community contributing their experience and knowledge. This is particularly the case for the members of the MRIWA Board and supporting advisory committees.

MRIWA Board members are appointed in accordance with Section 27(1)(a) of the MRIWA Act and are remunerated by an annual fee set by the Public Sector Commissioner. The fee has not been varied since first established in 20 December 2013.

Further information on MRIWA Board membership can be located in the *Overview* section of the Annual Report.

To ensure a relevant and responsive committee structure, MRIWA undertook a review of its approach in 2019-2020 with a decision to cease the former Advisory and Theme Committees approach.

Under the MRIWA Act, the MRIWA Board has the authority to establish any committee or appoint any organisation or individual to provide it with advice, especially on the merit of applications for research grants (section 60).

From 17 February 2020, the advisory committee convened by MRIWA took the form of an assessment panel comprised of Core Members and subject matter experts drawn from the MRIWA College and will be known as a Grant Assessment Panel.

Members of MRIWA advisory committees are appointed in accordance with Section 60(1) of the MRIWA Act and are remunerated based on attendance at a rate set by the Public Sector Commissioner. The rate has not been varied since first established in 20 December 2013.

Representation on the various committees prior to 17 February 2020 is outlined below. No Grant Assessment Panels have yet been convened.

Advisory Committee

The Advisory Committee met twice and participated in the Theme and Advisory Committee research briefing in 2019-20.

Name	Position	Appointment Approved	Period of Membership	Sitting Fees $
Ian Suckling	Chair	1 Aug 2018	31 Dec 2021	593[(a)]
Alison Morley	Deputy Chair	1 Feb 2018	31 Jan 2020	593
Christopher Baker	Member	1 Feb 2018	31 Jan 2020	384[(a)]
Gerard Danckert	Member	1 Feb 2018	31 Jan 2020	192[(a)]
John Dell	Member	1 Feb 2018	31 Jan 2020	0[(a)]
Rob Freeth	Member	1 Feb 2018	31 Jan 2020	576[(a)]
Rob Hough	Member	1 Feb 2018	31 Jan 2020	0[(a)]
Jon Hronsky	Member	1 Feb 2018	31 Jan 2020	384[(a)]

Find More Resources Theme Committee

The Find More Resources Theme Committee met twice participated in the Theme and Advisory Committee research briefing in 2019-20.

Name	Position	Appointment Approved	Period of Membership	Sitting Fees $
Jon Hronsky	Chair	1 Feb 2018	31 Jan 2020	352[(a)]
Peter Bewick	Member	1 Feb 2018	31 Jan 2020	228
James Cleverley	Member	1 Feb 2018	10 Jul 2019	-
Ivor Roberts	Member	1 Feb 2018	31 Jan 2020	114[(a)]
Caroline Perring	Member	10 Sep 2018	31 Jan 2020	114[(a)]

Notes

(a) Foregoes all renumeration and donates sitting fees back to MRIWA for the Education Program

Expand the Mining Envelope Theme Committee

The Expand the Mining Envelope Theme Committee met once and participated in the Theme and Advisory Committee research briefing in 2019-20.

Name	Position	Appointment Approved	Period of Membership	Sitting Fees $
Gerard Danckert	Chair	1 Feb 2018	31 Jan 2020	114[(a)]
John DeVries	Member	1 Feb 2018	31 Jan 2020	0[(a)]
Rathy Brandes de Roos	Member	15 Aug 2018	31 Jan 2020	0[(a)]

Increase Recoverable Value Theme Committee

The Increase Recoverable Value Theme Committee participated in the Theme and Advisory Committee research briefing in 2019-20.

Name	Position	Appointment Approved	Period of Membership	Sitting Fees $
Christopher Baker	Chair	1 Feb 2018	31 Jan 2020	0[(a)]
Grant Caffery	Member	1 Feb 2018	31 Jan 2020	0[(a)]
James Kyle	Member	1 Feb 2018	31 Jan 2020	0[(a)]
Gamini Senanayake	Member	1 Feb 2018	31 Jan 2020	114
William Staunton	Member	1 Feb 2018	31 Jan 2020	114

Improve Productivity Theme Committee

The Improve Productivity Theme Committee participated in the Theme and Advisory Committee research briefing in 2019-20.

Name	Position	Appointment Approved	Period of Membership	Sitting Fees $
Rob Freeth	Chair	1 Feb 2018	31 Jan 2020	0[(a)]
Tamryn Barker	Member	1 Feb 2018	31 Jan 2020	114[(a)]
Charles Elliot	Member	1 Feb 2018	31 Jan 2020	0[(a)]
John Hearne	Member	1 Feb 2018	31 Jan 2020	114[(a)]
Melinda Hodkiewicz	Member	1 Feb 2018	31 Jan 2020	0[(a)]
Sabina Shugg	Member	1 Feb 2018	31 Jan 2020	0[(a)]

New Products and Markets Theme Committee

The New Products and Markets Theme Committee participated in the Theme and Advisory Committee research briefing in 2019-20.

Name	Position	Appointment Approved	Period of Membership	Sitting Fees $
Alison Morley	Chair	1 Feb 2018	31 Jan 2020	0[(a)]
Peter Oliver	Member	1 Feb 2018	31 Jan 2020	0[(a)]
Kathleen Wright	Member	1 Feb 2018	31 Jan 2020	114[(a)]

Scholarships Panel

The Scholarships Panel met once in 2019-20

Name	Position	Appointment Approved	Period of Membership	Sitting Fees $
Kathleen Wright	Chair	1 Feb 2018	31 Jan 2020	0[(a)]
Gamini Senanayake	Member	1 Feb 2018	31 Jan 2020	0
Alison Morley	Member	1 Feb 2018	31 Jan 2020	0
Anil Subramanya	Member	1 Feb 2018	31 Jan 2020	0

Notes

(a) Foregoes all renumeration and donates sitting fees back to MRIWA for the Education Program

Contracts with Senior Officers

No member of MRIWA staff had any interest or benefit from any contract MRIWA entered.

Freedom of Information

The *Freedom of Information Act 1992* (WA) enables the public to apply for access to documents held by MRIWA. No freedom of information request was received by the organisation in 2019-20.

Public Sector Standards and Ethical Codes

All members of MRIWA Board, Advisory and Theme Committees and MRIWA College are aware of the need to comply with Part 4 – Administration, Subdivision 3 of the *Minerals Research Institute of Western Australia Act 2013* (WA), which sets out the provisions for disclosure of material personal interest, and MRIWA's Code of Conduct.

MRIWA reviewed its Code of Conduct in 2019-20 with a revised code endorsed by the MRIWA Board. Additional supporting guidelines were also prepared for managing personal interests.

MRIWA has complied with Section 31(1) of the *Public Sector Management Act 1994* (WA) in the administration of the MRIWA's human resource management practices relating to Public Sector Standards, Western Australian Public Sector Code of Ethics and MRIWA's Code of Conduct.

MRIWA utilises the Department of Mines, Industry Regulation and Safety's human resources services and is confident their human resources management principles have adequate checks in place to ensure compliance requirements are met.

In 2019-20 no breach claims were lodged in relation to either the Public Sector Standards or the WA Public Sector Commission's Code of Ethics.

MRIWA is compliant with the *Public Interest Disclosure Act 2003* (WA). In accordance with this Act, our Chief Executive Officer is our designated Public Interest Disclosure Officer.

In 2019-20 we had no public interest disclosures lodged under the Act. MRIWA submitted the Public Sector Entity Survey to the Public Sector Commission with no reports for breach of discipline under the *Public Sector Management Act 1994* (WA).

Bi-monthly reporting of MRIWA's gift and benefits register to the MRIWA Board continues to ensure no inappropriate acceptance of gifts or benefits and to monitor any notable trends.

Record Management Plan

MRIWA's Recordkeeping Plan was last reviewed in November 2019 in accordance with section 28 of the *State Records Act 2000* (WA).

The revised Recordkeeping Plan was originally scheduled for submission to the State Records Office in September 2020. Interruptions due to COVID-19 extended deadlines by 12 months.

MRIWA has been advised the State Records Office is now reviewing the existing seven standards and is intending to propose a new way of reporting for managing State records in a simplified single standard.

MRIWA will incorporate these changes into its Recordkeeping Plan, which is now due for submission in September 2021.

Other Legal Requirements

Annual Estimates

Statement of Comprehensive Income

As at 30 June 2020

	Estimate 2021 $
COST OF SERVICES	
Expenses	
Research grants	7,875,261
Scholarships	322,831
Loss on disposal of assets	
Employee benefits expense	785,155
Institute Contractor fees	50,000
Board and committee fees and costs	117,202
Supplies and services	346,943
Other expenses	51,944
Accommodation expenses	59,250
Depreciation expense	2,315
Total cost of services	**9,610,901**
Income	
Revenue	
Interest revenue	120,000
Other revenue	41,148
Revenue from Industry Sponsorship	3,221,554
Total revenue	**3,382,702**
Total income other than income from State Government	**3,382,702**
NET COST OF SERVICES	**6,228,199**

	Estimate 2021 $
Income from State Government	
State Government Grant	4,305,000
Resources received free of charge	59,250
Total income from State Government	**4,364,250**
Surplus/(Deficit) for the period	**(1,863,949)**
TOTAL COMPREHENSIVE INCOME FOR THE PERIOD	**(1,863,949)**

Statement of Financial Position

As at 30 June 2020

	Estimate 2021 $
ASSETS	
Current Assets	
Cash and cash equivalents	2,316,067
Restricted cash and cash equivalents	9,264,266
Receivables and other assets	459,155
Other Current Assets	30,000
Total Current Assets	**12,069,488**
Non-Current Assets	
Property, plant and equipment	9,261
Total Non-Current assets	**9,261**
TOTAL ASSETS	**12,078,749**

	Estimate 2021 $
LIABILITIES	
Current Liabilities	
Payables	629,159
Provisions	15,600
Deferred revenue	4,411,850
Total Current Liabilities	**5,056,609**
Non-Current Liabilities	
Provisions NCL	57,620
Total Non-Current Liabilities	**57,620**
TOTAL LIABILITIES	**5,114,229**
NET ASSETS	**6,964,520**
EQUITY	
Accumulated surplus	6,964,520
TOTAL EQUITY	**6,964,520**

Statement of Cash Flows

For the year ended 30 June 2020

	Estimate 2021 $
Cash flows from State Government	
Cash receipts from Government	4,305,000
Cash flows from operating activities	
Payments	
Research Grant Payments	(8,670,007)
Employee benefits	(785,155)
Institute Contractor Fees	(50,000)
Board and Advisory Committee Fees	(65,886)
Supplies and Services	(398,887)
GST Paid on Purchases	(911,889)
Other payments	
Receipts from Sponsors	4,733,404
Interest received	120,000
GST received on sales	473,340
Net GST refunded from ATO (or paid)	438,549
Cash generated from operations	**(5,116,530)**
Cash flows from investing activities	
Purchase of non-current assets	-
Net cash from investing activities	**-**

	Estimate 2021 $
Cash flows from financing activities	
Related entities loans	-
Proceeds from other borrowings	-
HP Financing	-
Finance leases	-
Net cash from financing activities	**-**
Net increase in cash and cash equivalents	(811,530)
Cash and cash equivalents 1 July 2018/1 July 2019	12,391,863
CASH AND CASH EQUIVALENTS AT END OF YEAR	**11,580,333**

Our Performance

This section contains and overview of the MRIWA Performance Management Framework and the audited key performance indicators for 2019-20.

Performance Management Framework

Government Goal

Responsible financial management and better service delivery

Outcomes and Services

To deliver on the government goal, MRIWA works to achieve the following outcomes through its services:

1. Fostering and promoting minerals research for the benefit of the State.
2. Administer research grant applications and manage approved projects efficiently.

Measuring Our Performance

The key performance indicators reported here are designed to provide measurable outcomes relevant to MRIWA's objective and functions as required by the *Minerals Research Institute of Western Australia Act 2013* (WA).

Changes to outcome-based management framework

MRIWA's Outcome Based Management Framework did not change during 2019-20

Audited Key Performance Indicators

Certification of Key Performance Indicators

For the year ended 30 June 2020

We hereby certify the key performance indicators are based on proper records, are relevant and appropriate for assisting users to assess the Minerals Research Institute of Western Australia's performance, and fairly represent the performance of the Minerals Research Institute of Western Australia for the financial year ended 30 June 2020

Miriam Stanborough
Chairperson of the Board

Date: 17 August 2020

Helen Cook
Deputy Chairperson of the Board

Date: 17 August 2020

Key Effectiveness Indicator

Government Goal: Responsible financial management and better service delivery

Outcome 1: Fostering and promoting minerals research for the benefit of the State.

One measure of the effect of MRIWA research investments is to use minerals royalties accruing to Western Australia and the economic impact of that research more broadly. However, it is difficult to measure the direct impact resulting from minerals research due to the duration of the research projects; the many other factors influencing implementation; and the timeframe between creation of knowledge and generation of royalties.

For these reasons, the key indicator of effectiveness for MRIWA demonstrates the increased value of research enabled by leveraging funds from third parties on the State Government investment through MRIWA.

Key Effectiveness Indicator	2017-18 Actual	2018-19 Actual	*2019-20 Target*	2019-20
Ratio of total cash investments in research projects to total approved MRIWA cash investment in those research projects [(a), (b)]	1.52[(c)]	3.82[(d)]	*4*[(e)]	14.51[(f)]

Notes:

(a) Investment totals are for projects approved by the MRIWA Board in the reporting year.

(b) Measure reported as a multiple.

(c) The below target actual result is primarily the consequence of the Board making an investment of $5,500,000 in the Future Battery Industry (FBI) CRC: the return on investment through financial leverage by co-investors will only occur once the Participant Agreement and subsequent Project Agreements are signed allocating funding to specific research projects. The Participant Agreement was signed in March 2020 with a number of Project Agreements currently being negotiated. Without including the investment in the FBI CRC, the Effectiveness Indicator is 2.44.

(d) The above target result is as a consequence of the Board requiring demonstration of leverage of 3 or above in applications it approved throughout 2018-19.

(e) The Board increased the Key Effectiveness Indicator target to 4 by resolution at its meeting on 14 October 2019.

(f) The return on investment through financial leverage by co-investors is being realised on FBI CRC and CRC ORE funds as the Board is now allocating funding to specific research projects. Without including the investment in the FBI CRC and CRC ORE funding, the Effectiveness Indicator is 4.01.

Key Efficiency Indicator

Government Goal Responsible financial management and better service delivery

Service 1: Administer research grant applications and manage approved projects efficiently.

The primary service provided by MRIWA is to identify research opportunities and resources, support the development of grant applications and to manage a portfolio of approved projects.

The administration effort required of MRIWA to do so is measured as a function of the total financial scale of the portfolio of research projects.

The key indicator of efficiency demonstrates the focus on maximising investment in research projects and a continued focus on minimising overheads from administration efforts.

Key Efficiency Indicator	2017-18 Actual	2018-19 Actual	*2019-20 Target*	2019-20 Actual
Total administration cost for the year as a percentage of the total cash value of research projects and the education program under management during the year.	3.3%	4.2%[(a)]	*4%*	2.01%[(b)]

Notes:

(a) The efficiency indicator target was lowered to 4% for 2018-19 from the target 4.5% in the preceding year to continue a focus on administrative efficiencies. Increases in administration expenses resulting from recruitment activity for the CEO role, higher costs for IT and financial management services than anticipated and the need to engage consulting services for the delivery of the Economic Impact Assessment and Five Year Review of MRIWA required as part of the 2019/20 budget submission have resulted in a higher than targeted outcome for the Institute's Efficiency Indicator.

(b) The above target response is a result of the commencement of a number of Future Battery Industry (FBI) CRC projects and a project with the MinEx CRC resulting in the total project value for these being incorporated into the total cash value of research projects under management by MRIWA.

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Visit the MRIWA website for digital versions of this report.

Disclaimer

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