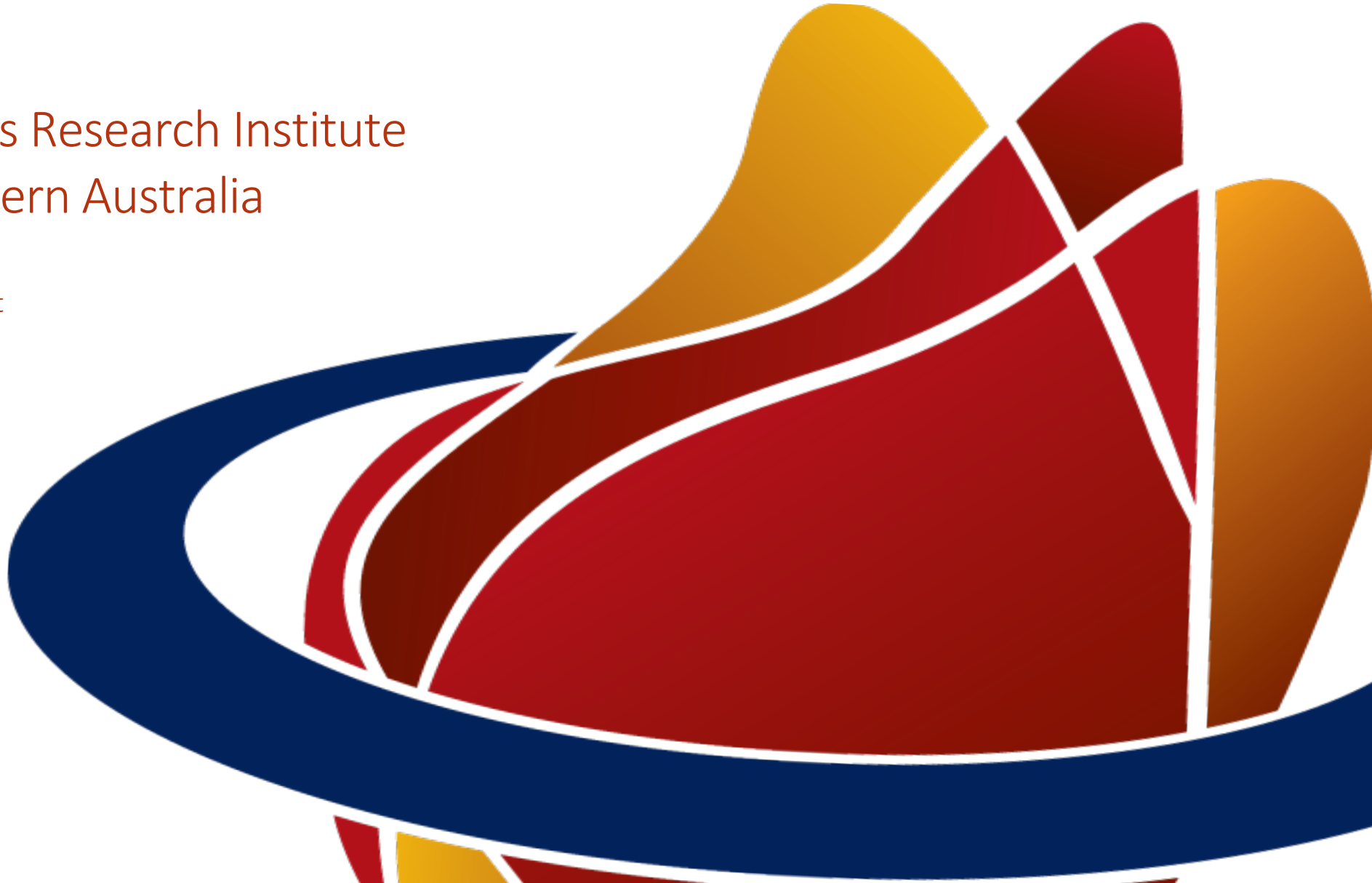
mriwa
Minerals Research Institute
of Western Australia

Minerals Research Institute of Western Australia

Annual Report
2018-2019



Statement of Compliance

For year ended 30 June 2019

HON BILL JOHNSTON MLA
Minister for Mines and Petroleum

In accordance with section 63 of the *Financial Management Act 2006*, we hereby submit for your information and presentation to Parliament, the Annual Report of the Minerals Research Institute of Western Australia for the reporting period ended 30 June 2019.

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

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

Denise Goldsworthy
Chairperson of the Board

Date: 28 August 2019

Helen Cook
Deputy Chairperson of the Board

Date: 28 August 2019

Vision

Minerals research advancing WA

Values

Engaged, Connected, Progressive, Respectful, Agile

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

Table of Contents

Overview O-1

Highlights O-1
Message from the Chair O-2
Responsible Minister O-4
About Us O-4
Economic Impact O-4
Message from the CEO O-5
- Significant Issues and Trends O-5

Our Organisational Structure O-6
Our Team O-6
Our Directors O-7
Legislation O-10
- Enabling and Administered Legislation O-10
- Other Key Legislation Impacting on our Activities O-10

Report on Operations O-11
- Actual Results versus Budget Targets O-11
- Summary Key Performance Indicators O-11

Our Projects Pr-1

Highlights Pr-1
Research Priorities Pr-2
Research Portfolio Overview Pr-3
Our Scholars Pr-4
Scholarships Overview Pr-4
Our Research Pr-8
1. Find More Resources Pr-10
2. Expand the Mining Envelope Pr-17
3. Increase Recoverable Value Pr-23
4. Improve Productivity Pr-27
5. Develop New Products and Markets Pr-32

Financial Statements and Notes FS-1

Independent Audit Opinion FS-2
Financial Statements for the year ended 30 June 2019 FS-4

Our Governance G-1

Message from the Audit and Risk Committee Chair G-2
Committee Structure and Decision-Making Framework G-3
Disclosures G-4
- Shared Responsibilities with Other Agencies G-4
- Ministerial Directives G-4
- Other Financial Disclosures G-4
- Governance Disclosures G-5
- Other Legal Requirements G-8

Our Performance P-1

Performance Management Framework P-3
Changes to Outcome-Based Management Framework P-3
Audited Key Performance Indicators P-3

Overview

Highlights

$46.6M
Total Value of Research Supported by MRIWA

$37.7M
Total Value of 46 Individual Research Projects

$7.1M
Invested by MRIWA in 3 Cooperative Research Centres

$1.7M
Invested by MRIWA in 17 PhD Scholarships

Message from the Chair

Ms Denise Goldsworthy

It has been a pleasure to lead MRIWA through a time where our impact on the industry and the State has been widely acknowledged, culminating in approval for additional funding in the recent State Budget. We also welcomed our new CEO Nicole Roocke, and farewelled our previous CEO Mark Woffenden, who retired during the year. Key milestones achieved by the organisation have been many and varied.

In March this year, the results of the *Minerals Research Institute of Western Australia Act 2013* review were released. ACIL Allen found MRIWA has been effective in meeting its overall objectives as established in its Act and Research Priority Plan, notwithstanding at the time the review was completed, MRIWA had yet to meet its formal effectiveness KPI regarding funding leverage.

It is pleasing to note this year MRIWA has indeed met its effectiveness KPI regarding funding leverage.

The review found the Act does not constrain MRIWA in any way, and as demonstrated by the assessments of efficiency and effectiveness, MRIWA has delivered on its statutory objectives.

The review explored three areas in detail:

- *Is MRIWA operating efficiently?*

  MRIWA's administrative costs have not increased beyond its original levels, averaging around $1 million per annum or around 19 per cent of total expenditure between 2013-14 and 2017-18. The Institute has met its efficiency indicator in the last two years of operation as research funding commitments increased.

- *Has MRIWA been effective in meeting its overall objectives?*

  This assessment was linked to the economic impact assessment review also completed by ACIL Allen. Using their Benefit Cost Assessment framework, they estimated MRIWA is forecast to deliver a net social benefit of $37 million between 2018-19 and 2027-28, calculated as the difference between the cost to the State of MRIWA's operations of $17.4 million and the anticipated benefit of the research programs analysed in the study which are forecast to deliver $54.5 million.

  This results in a Benefit Cost Ratio of the Institute's operations since its inception of 3.12, implying for the research programs analysed every dollar of State Government funding is forecast to produce at least $3.12 of benefits.

  MRIWA's benefits also extend to intangibles such as fostering collaboration and assisting to create linkages between stakeholders who would otherwise have no means of connecting organically.

- *Does a demonstrable need exist for MRIWA?*

  The mining industry must continually work to become more productive and efficient in the face of growing competitive challenges.

  MRIWA's role is arguably more vital than ever as a catalyst for mining innovation and technology development in Western Australia, as the industry moves and evolves beyond the blunt instrument of billions of dollars of new mines and turns to the more specific toolkit enabled by technology and innovation.

There was universal endorsement of the important role MRIWA is playing in supporting the minerals industry in Western Australia by filling a gap in the market between science and application; between industry and academia.

MRIWA is seen by stakeholders as part of the State's comparative and competitive advantage in the mining and minerals industry.

- *What to do differently?*

  Increase the awareness of MRIWA; review the Research Priority Plan to ensure each of the research themes are still contemporary; allocate a greater share of the funding portfolio towards technology and supply chain innovation and review treatment of IP and alternative funding sources.

Building on the recommendations from the review, ongoing policy guidance from the Minister and his advisers, and input from the Board and the Executive a new Strategic Plan was developed for MRIWA. While predominantly an internal document, it includes the following four pillars and 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 to attract 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.

This, combined with the revised Research Priority Plan due to be released in the second half of 2019, will set the direction of the Institute for the coming years.

Reflecting on the last twelve months, the Board approved new MRIWA investment of $1.74 million matched by sponsors' cash support of $4.9 million.

An investment of $1.73 million of MRIWA funds continues to be made into PhD research projects via scholarships, with 15 scholarships directly funded by the Institute and a further 2 scholarships via the ARC Industry Transformation Training Centre.

These figures bring the value of R&D supported by MRIWA to $46.6 million at the end of the financial year, of which 80% is directly managed by the Institute.

This includes the significant contribution by the State Government into developing a future battery industry.

The Future Battery Industry Cooperative Research Centre was successful in securing Federal funding in April 2019.

As the active representative for the WA Government in this collaboration, MRIWA has a key role in ensuring quality governance processes and prioritisation of research aimed at supporting the State's Future Battery Industry Strategy.

I am most grateful to all my Board colleagues as they exercise their responsibilities with enthusiasm and commitment.

The members of the Advisory Committee and Theme Advisory Committees also continue to provide indispensable advice to the Board on proposed research project investment and priorities.

I would also like to thank the small but dedicated MRIWA team for successfully managing the organisation.

Denise Goldsworthy
Chairperson of the Board

Responsible Minister

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

About Us

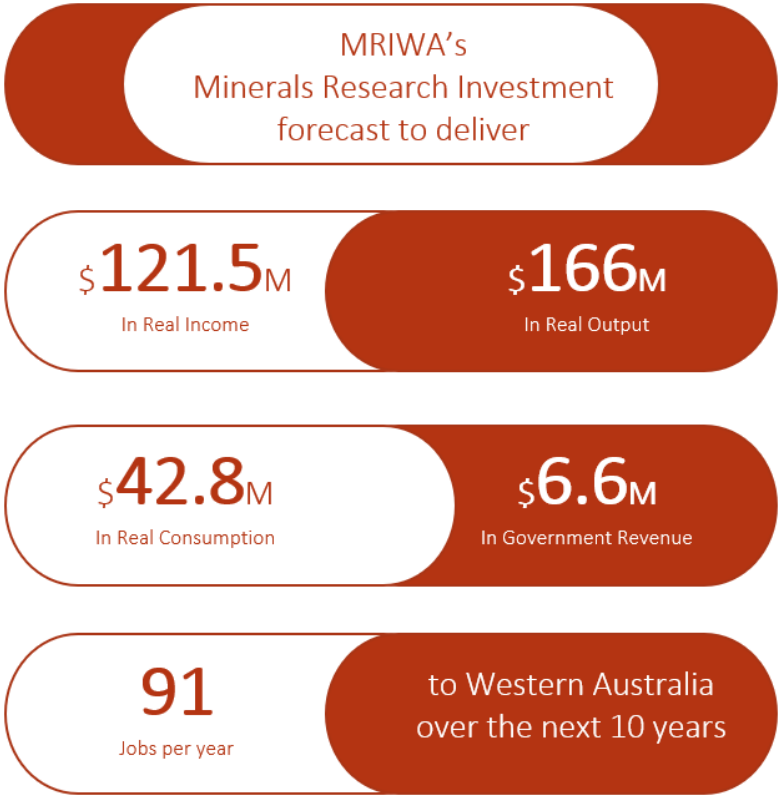
MRIWA is a statutory body established by the Western Australian Government in 2013 under the *Minerals Research Institute of Western Australia Act 2013* (the Act).

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.

Economic Impact



Source: ACIL Allen, MRIWA Economic Impact 2018

Message from the CEO

It was my privilege to join the MRIWA team in November 2018.

The initial challenge on arrival was to seek further funding from the State Government. With the support of the Minister, a further $6 million has been secured over the forward estimates.

This, combined with the funding commitment made in the 2017-18 budget for $5.5 million for the Future Battery Industry Cooperative Research Centre (FBI CRC), will enable the Institute to invest an average of $2.8 million of state government funds per year into minerals research which will deliver benefit to Western Australia.

Twelve new research projects were approved by the Board during this financial year for work to be undertaken across the mining value chain. The third-party support for this research is evident in the Institute achieving its Effectiveness KPI for the first time.

A key focus since commencing in the role has been to engage with the Board and stakeholders to understand where there is future opportunity for the Institute.

Consistent across all discussions is the need to promote the outcomes of the research MRIWA is involved with, not just to increase awareness, but to also encourage implementation, adoption and new application.

To achieve this focus, one of the four key pillars of the strategic plan, now approved by the Board, is Knowledge Transfer.

As we have a suite of projects nearing completion, we will be increasing our efforts to communicate this work.

The review of the Institute's Research Priority Plan encompassed a broad range of preliminary consultation which informed the development of a revised Plan. This was released for public consultation with the board due to consider the feedback at its first meeting in 2019-20.

Significant Issues and Trends

Current and Emerging Issues and Trends

Future Battery Industry

With the successful outcome of the FBI CRC bid and the release of the State Government's Future Battery Industry Strategy, the Institute has been working to develop an approach to support the early commencement of the FBI CRC to maximise the opportunity from the State Government's investment and support the delivery of the Future Battery Industry Strategy.

Close interagency collaboration across government will be required to achieve this.

Research Sponsorship

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 variation in economic conditions 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 And Forecast Results Of Operations

It is likely the MRIWA operations will undergo a period of consolidation during 2019 as a result of the implementation of the new strategic plan and drive for continuous improvement in grants administration practices.

The most significant areas for change will be in relation to the implementation of improvements in grant administration processes and databases and an increase in the communication of research outcomes.

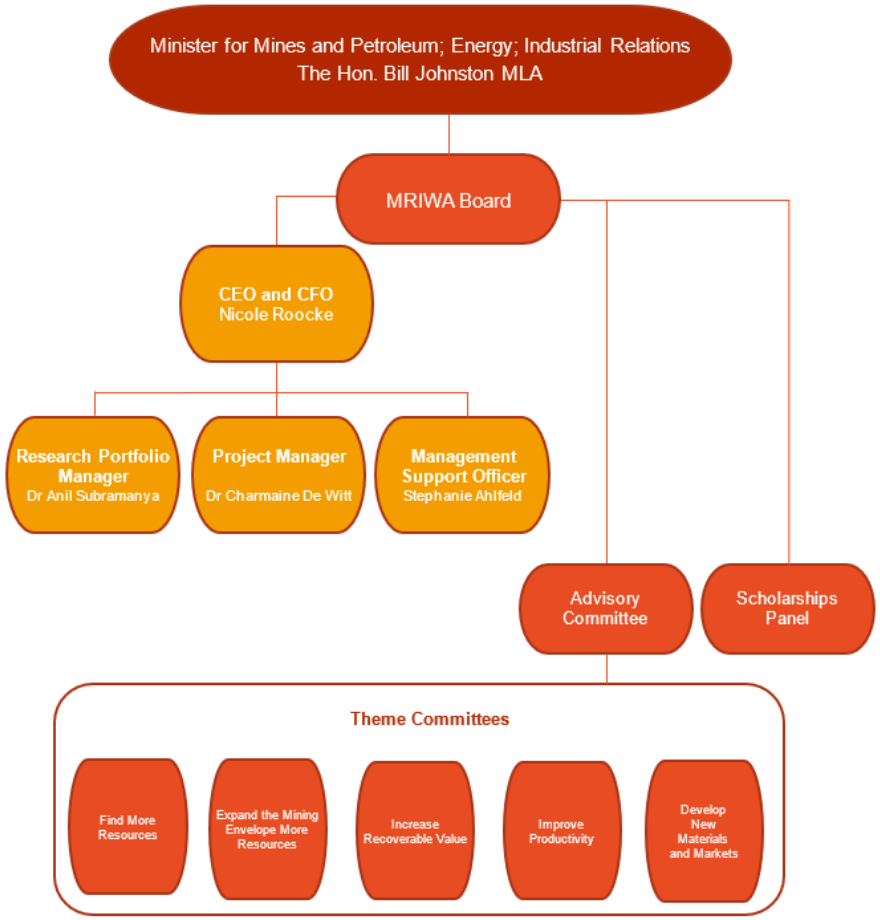
I would like to thank the MRIWA team for their support and preparedness to find opportunities to grow the organisation above and beyond its current strong foundations.

The commitment of Board and committee members to deliver benefit to Western Australia through minerals research is to be commended. This delivers collaboration, alignment and leverage of expertise across the whole minerals research ecosystem.

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 Organisational Structure



Our Team

Senior Officer

Ms Nicole Roocke, *Chief Executive Officer and Chief Financial Officer*
Appointed CEO in November 2018, Nicole spent the last 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 UWA and a Master of Risk Management from UNSW.

Mr Mark Woffenden
Mark was inaugural Chief Executive Officer for MRIWA from March 2013 until 19 November 2018.

MRIWA Team

Dr Anil Subramanya, *Research Portfolio Manager*
Anil is a Geochemist/Exploration Geologist with more than 25 years' experience in minerals exploration and the management of large, multi-disciplinary teams within the mining industry. Anil has spent significant time in the private and public sectors, and as a researcher, in fomenting and developing collaboration between the METS and Mining industries, particularly SMEs, academia and government.

Dr Charmaine de Witt, *Project Manager*
Charmaine has an extensive research career in the Alumina industry as an acknowledged expert in lime chemistry.

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.

Our Directors

Ms Denise Goldsworthy became Chair of the Minerals Research Institute of Western Australia in January 2018.

Following 17 years at BHP Steel and 14 years in Mining (iron ore and minerals), including roles as Managing Director Dampier Salt, Managing Director HIsmelt and Chief Commercial Officer Autonomous Haul Trucks (Rio Tinto), Denise has successfully transitioned to the third phase of her career as a Non-Executive Director and advisor on research, technology and innovation through the company Alternate Futures, of which she is the owner and Managing Principal.

Among Denise's honours is being named the 2010 Telstra Australian Business Woman of the Year. A member of Chief Executive Women (CEW), she was inducted into the WA Women's Hall of Fame in 2011.

Denise is a member of the Cooperative Research Centres advisory committee.

Denise's other current board positions are Chair, ChemCentre WA; Non-Executive Director, Western Power; Non-Executive Director, Export Finance Australia; Member of Council and Chair Quality, Audit and Risk Committee at Edith Cowan University; Member of Commercialisation Advisory Board, Curtin University; Fellow of ATSE and Chair of ATSE's Resources Forum; and Chair for the Navy Clearance Diver Trust.

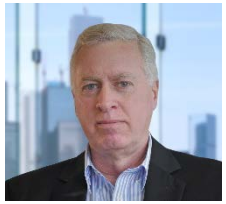
Ms Helen Cook became Deputy Chair of the Minerals Research Institute of Western Australia in October 2017.

Helen has over 20 years of board experience across a range of sectors including resources, infrastructure, insurance, finance and in government.

Prior to joining the MRIWA Board in 2014, Helen was the National Partner in charge of KPMG's Energy and Natural Resources Group. Helen's other current board positions are Non-Executive Director RAC Holdings, RAC Finance; and RAC Insurance, UWA Mining Energy and Natural Resources Law Advisory Board; Major Performing Arts Panel, Australia Council; Chair, Chamber of Arts & Culture WA; Councillor of the National Art Gallery.

Helen is a WA Councillor of the Australian Institute of Company Directors and a member of Chief Executive Women.

Her past Board roles include Deputy Chair of Fremantle Ports, Chair of the Art Gallery of WA, Perth Theatre Trust and a range of other roles in the resources sector.



Prof 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) 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.

Ms Jane Hammond has 20 years' experience in government and has worked in a range of senior legal and policy roles in State Government agencies in WA and NSW. Her home agency is the Department of Mines, Industry Regulation and Safety.

Jane has a deep understanding of the structure, functions and strategic aims of government, as well as a strong technical understanding of the legal underpinnings of the system. Jane's background in legislative drafting has led to her involvement in a number of legislative projects for the WA Government, including developing MRIWA's foundation legislation.

Mr Larry Lopez is the Director of the Commonwealth's Accelerating Commercialisation Program. He is responsible for leading the Government's efforts to identify and help businesses, entrepreneurs and researchers commercialise novel products, processes and services with significant market potential.

Larry is a Partner at Perth-based Australian Venture Consultants (AVC). AVC enables their clients' decision-making processes through fact-based analytics informed by research and the insights it has acquired through almost 30 years of hands-on experience and engagements across the innovation and technology start-up ecosystem.

Prior to moving to Australia in 2006, Larry spent 17 years at Silicon Valley Bank. During his tenure at SVB he held various senior and executive positions and played a key role in growing the company from a local community bank to a global leader in providing financial services for knowledge-based companies and investors. He was the founder and Managing Director of the Bank's International Venture Capital Group and was an active investor in Israel, Australia and Europe.

Larry is a Director of several IT-related private companies and sits on several not-for-profit boards. He has also been a partner or director of several venture capital funds in the US and Europe and is currently a director of Jolimont Global Mining Systems, a global venture capital fund focused on 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, including 15 years in executive leadership roles. 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, and is currently President of Rowing WA.

Ms Miriam Stanborough is a chemical engineer with 18 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, a Perth-based Engineering, Construction & Maintenance company.

Miriam has previously held roles in Technical Development, Production Management, Project Management, Business Improvement, HR & Diversity strategy, and Sales & Marketing.

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

Miriam's other current board roles are: Chair of SHINE Inspire Achieve Belong Inc, and Board Member of the Northern Agricultural Catchments Council.

MRIWA Board

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 Dec 2013.

Membership as at 30 June 2019	Initial Appointment	Term Expires	No. of Meetings Attended
Denise Goldsworthy (Chair)	1 Feb 2016	31 Dec 2021	6 of 6
Helen Cook (Deputy Chair and Chair, Audit and Risk Committee)[a]	28 Jan 2014	31 Jan 2020	6 of 6
Mark Bush[a] [b]	1 Feb 2016	31 Dec 2021	6 of 6
Jane Hammond[c]	1 Oct 2017	31 Jan 2020	4 of 6
Larry Lopez[a] [d]	1 Jan 2016	31 Dec 2021	5 of 6
David Rose[b]	1 Jun 2018	31 Jan 2021	5 of 6
Miriam Stanborough[b]	1 Oct 2017	31 Jan 2020	6 of 6

Notes:

(a) 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 KPMG attend ex-offico.

(b) Foregoes a portion of renumeration and donates back to the MRIWA Director's Scholarship

(c) Ineligible for renumeration in accordance with Premier's Circular 2010/02 State Government Boards and Committees

(d) Foregoes all renumeration and donates back to the MRIWA Director's Scholarship

Legislation

Enabling and Administered Legislation

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

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

Other Key Legislation Impacting on our activities

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

- *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

	2019 Target $	2019 Actual $	Variation $
Total cost of services	10,847,817	5,503,209	5,344,608
Net cost of services	6,439,506	3,162,988	3,276,518
Total equity	9,501,850	10,621,653	1,119,803
Net increase / (decrease) in cash held	(1,199,725)	410,684	1,610,409
Approved salary expense level	532,600	587,398	54,798

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	2018-19 Target	2018-19 Actual
Ratio of total cash investments in research projects to total approved MRIWA cash investment in those research projects	*3*	3.82
Key Efficiency Indicator	**2018-19 Target**	**2018-19 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%*	4.2%

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

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

$46.6M
Total Value of Research Supported by MRIWA

$37.7M
Total Value of 46 Individual Research Projects

$7.1M
Invested by MRIWA in 3 Cooperative Research Centres

$1.7M
Invested by MRIWA in 17 PhD Scholarships

Research Priorities

Theme 1: Find More Resources	Theme 2: Expand the Mining Envelope	Theme 3: Increase Recoverable Value	Theme 4: Improve Productivity	Theme 5: New Products and Markets
1.1 - Mapping Cover	2.1 - Deep Extraction Systems	3.1 Modelling and Simulation of Processes	4.1 Productivity Optimisation	5.1 New Mineral Products
1.2 - Distal Footprints	2.2 - Engineering in Complex Rock Masses	3.2 Accelerated Technology Development		
1.3 - Sub-regolith Geology	2.3 - Deep In-mine Environments			
1.4 - Dataset Correlation				

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 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 Research Priority Plan describes the medium to long term knowledge and technology needs of the State's minerals industry to ensure it can deliver an economic and social benefit for Western Australia.

The Research Priority Plan is undergoing review with a revised Research Priority Plan expected to be released in the second half of 2019.

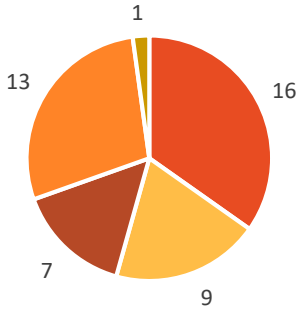
Research Portfolio Overview

$37.7M Total Value of 46 Research Projects supported by MRIWA

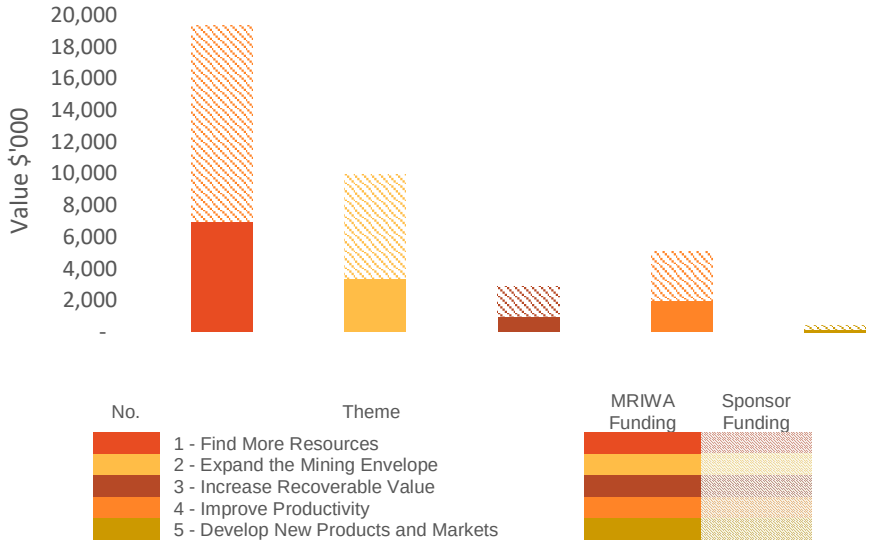
$13.5M Value of MRIWA's contribution to the 46 Research Projects

$24.2M Value of third party sponsorship to the 46 Research Projects

Total Number of Individual Research Projects Supported by MRIWA by Theme



Total Value of Individual Research Projects Supported by MRIWA by Funding Source



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 who are required for the future 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 Director's PhD Scholarship at no less than $40,000 annually in one of the fields of In-Situ Leaching, Data Analytics, or Scale-up from Bench to Production
- 2 PhD research scholarships at no less than $30,000 annually
  - Odwyn Jones Scholarship
  - MRIWA Research Scholarship for Women

Indirectly, approximately a further 45 PhD students are supported by MRIWA through their direct involvement with the individual research projects summarised in the next section.

Scholarship Overview

17 PhD Scholarships directly funded by MRIWA

$1.7M Value of PhD Scholarships directly funded by MRIWA

Approximately 45 PhD Scholarships indirectly supported funded by MRIWA

Research Scholarship for Women

Recipient: Pollyanna Moro

Topic: Geodynamics and basin evolution of the Paterson Orogen from Paleoproterozoic to Neoproterozoic based on 3D geophysical modelling and data inversion.

Host University: University of Western Australia

Value: $106,050

Status: Commenced

Odwyn Jones Scholarship

Recipient: Xingjie Chen

Topic: Investigating the underground support provided by shotcrete using tailings and waste rock.

Host University: University of Western Australia

Value: $105,000

Status: Awaiting visa

Industrial Transformation Training Centre for Transforming Maintenance through Data Science

The Australian Research Council (ARC) Industrial Transformation Training Centre (ITTC) for Transforming Maintenance through Data Science seeks to transform the maintenance management process, enabling Australian companies to lead the way maintenance is conducted, increasing both productivity and profitability through the automation of the work management stages.

MRIWA's contribution will fund 2 PhD Students within the ITTC.

Value: $240,000

Status: First round assessment of applications underway

Partners: Curtin University, University of Western Australia, CSIRO, Alcoa, BHP, Roy Hill, CORE Innovation Hub and MRIWA

For more information about the Centre visit www.maintenance.org.au

Director's Scholarship

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

Project No	Scholarship Recipient	Scholarship Topic	Host University	Duration (yrs)	MRIWA Contribution ($)	Status
M0455	Evelien Martens	Feasibility of Electrokinetic In-Situ Leaching	University of Western Australia	3	126,360	Completed
M0471	Ahmad Saleem	Quantifying the Role of Exploration Upside in Mineral Project Evaluations: The Missing Link in Project Value Determination?	University of Western Australia	3	104,006	Withdrawn – June 2019
M0501	Yihao Fu	Characterization of ore and bulk solid systems by use of multivariate by image analysis and deep learning neural networks	Curtin University	3.5	104,006	Commenced
M0523	Keith Giglia	Monitoring and control of hydrocyclones by use of convolutional neural networks and deep reinforcement learning.	Curtin University	3.5	106,050	Commenced

MRIWA Research Scholarship for Women

Project No	Scholarship Recipient	Scholarship Topic	Host University	Duration (yrs)	MRIWA Contribution ($)	Status
M0524	Kudzai Angeline Mchibwa	Innovative processes for leach liquor purification and production of battery grade LiOH from Li mineral resources	Murdoch University	3.5	105,000	Commenced

MRIWA Scholarships

Project No	Scholarship Recipient	Scholarship Topic	Host University	Duration (yrs)	MRIWA Contribution ($)	Status
M0454	Siwei Chen	Rock Fracture under the action of multiple field coupling	Curtin University	3	105,000	Commenced
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	105,000	Commenced
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	105,000	Commenced
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	105,000	Commenced
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	69,006	Commenced
M0474	Rashid Vaneghi	Progressive Damage Mechanisms of Rocks Subjected to Cyclic Loading	Curtin University	3	69,006	Commenced
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	69,006	Commenced
M0502	Zela Ichlas	Development of an Industrially Applicable Electrostatic Solvent Extraction Column for Process Metallurgy	Curtin University	3.5	105,000	Commenced

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 theme, this section provides an overview of all research MRIWA supported throughout 2018-19.

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

All MRIWA research reports can be located online via our website[1]

MRIWA Reports

The first report by the Western Australian Mining and Petroleum Research Institute, MRIWA's predecessor, was published in 1983.

Mr J.G. Dunn from the Western Australian Institute of Technology, now Curtin University, examined *The Flash Smelting of Nickel Sulphide Concentrates.*

At this time the global nickel industry was suffering from a world recession in the steel industry, driving local producers to focus on productivity improvements.

MRIWA has gone on to support the mining industry over the last 36 years by investing in research to find solutions to issues so Western Australia continues to benefit from the sector.

The majority of MRIWA's 323 research reports can be accessed via our website[1].

[1] https://www.mriwa.wa.gov.au/publications/previous-project-reports/

Overview - New Projects approved by the MRIWA Board in 2018-19

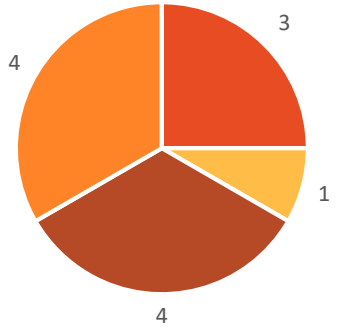
12 New projects approved by the MRIWA Board

$6.6M Total value of new projects

$1.7M Value of MRIWA's contribution to new projects

$4.9M Value of third party sponsorship into new projects

Number New of Projects by Theme



Value of New Projects by Funding Source

THEME 1: FIND MORE RESOURCES - Mapping Cover

New Project Approved by the Board in 2018-2019

Geology, Mineralogy and Metallurgy of eMaterials Deposits in WA (M0532)[1]

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $525,146 MRIWA Contribution: $175,146 over 2 years	Curtin University Mark Aylmore	Galaxy Resources Limited Geological Survey of Western Australia Lithium Australia NL Rio Tinto Exploration Pty Limited

The Challenge

Knowledge of the deportment of lithium and associated minerals in ore bodies, and linking the mineralogy to the fundamental processes of mineral liberation, thermal alteration and chemical dissolution is essential to predict the response of ore reserves to metallurgical treatment options.

Proposed Solution

1. Geological database on LCT (Li, Cs, Ta) pegmatite mineral systems in WA
2. Quantitative understanding of the mineralogical deportment of economic and deleterious elements in pegmatitic deposits, identifying factors that improve or inhibit economic recovery of Li
3. Geometallurgical models optimising the development of Li deposits
4. Verification of the suitability of field portable devices for determining Li abundance and distribution at exploration sites and during drilling operations
5. Multi-institutional “Centre of Excellence” to foster capability and capacity of WA research institutions to conduct eMaterials-relevant research

Proposed Benefits to WA

Improved efficiencies in exploration, mineral beneficiation and processing techniques for WA lithium pegmatite deposits to underpin a resilient and sustainable eMaterials industry in WA

1. CRC-P Extension Project Application Pending

Completed Project in 2018-2019

Multi-scaled near surface exploration using ultrafine soils (M0462)

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $387,000 MRIWA Contribution: $149,000 over 2 years	CSIRO - Mineral Resources Flagship Ryan Noble	AngloGold Ashanti Australia Ltd Antipa Minerals Ltd Encounter Resources Ltd First Quantum Minerals (Australia) Pty Ltd Geological Survey of Western Australia Gold Road Resources Ltd Northern Star Kanowna Pty Ltd - NSR Ltd

The Challenge

To develop and test a new analytical workflow to separate the <2 µm soil and sediment fractions for multi-element analysis and combine with other, not commonly utilised physico-chemical parameters to aid greenfields exploration.

Key Findings

1. The value of using <2 µm fractions for exploration geochemistry was demonstrated with gold and pathfinder element concentrations increased 180-250% compared to conventional (<250 µm fraction) analysis
2. Below detection gold (null) results reduced from 70% to 10%
3. Development of the Ultrafine+ workflow

Benefits to WA

- Improvement to the WA greenfields exploration success through the reduction of nugget effects in gold and the challenges with detection limits in materials that are dominated by quartz sand
- Commercialisation of the Ultrafine+ workflow resulting increased business opportunity for the commercial laboratory partner (Lab West Pty Ltd)

Ongoing Projects

Project No	Project Title	Research Organisation & Primary Contact	Sponsors	Duration (yrs)	MRIWA Contribution ($)	Total Project Value ($)
M0467	Mineralogical and lithological controls on REE distribution in the Argyle diamond deposit	Curtin University Louisa O'Connor	Argyle Diamonds	2	30,000	60,000
M0494	Mapping chemical architecture of gold camps	CSIRO - Mineral Resources Flagship John Walshe	Evolution Mining Limited Gold Road Resources Ltd Northern Star Kanowna Pty Ltd - NSR Ltd Ramelius Resources Ltd Saracen Gold Mines Pty Ltd	1.2	410,000	1,021,180
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	90,000	280,000

THEME 1: FIND MORE RESOURCES - Distal Footprints

New Project Approved by the Board in 2018-2019

Integrated 3G - Geochronology-geochemistry-grain shape: a new toolkit for mineral sands understanding (M0551)

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $740,000	Curtin University Milo Barham	Curtin University Iluka Resources
MRIWA Contribution: $260,000 over 3 years		

The Challenge

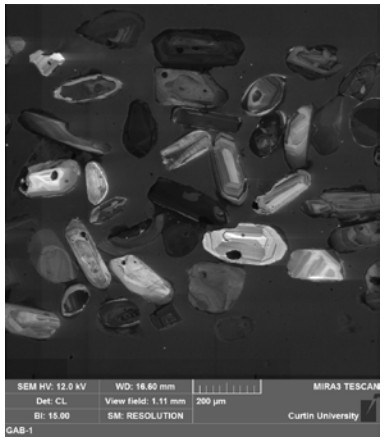
With models of mineral sand deposit genesis remaining largely unchanged for decades a lack of new globally significant discoveries, and decline in economic return from mineral sands in Australia in recent years, a different approach is required for defining new exploration spaces.

Proposed Solution

Application of new and integrated single-grain geochemical fingerprinting approaches to illuminate previously enigmatic aspects of detrital grain histories (e.g. zircon, rutile, apatite) and draw out the importance of shared traits among world-class mineral sand deposits and thus decipher controls of heavy mineral sands systems more broadly. Combined with this is a new technique based on the utilisation of rapid, low-cost grain shape analysis to resolve the ultimate sources of component heavy minerals (via specific chemistry/ temperature conditions) as well as their transport histories.

Proposed Benefits to WA

- Development of new WA-based techniques and expertise for the mineral sand industry
- Facilitation of cheaper, faster and highly diagnostic mineral provenance and grain transport history reconstruction which can be used to explore for new deposits



Detrital zircon grains from southern Australia imaged using cathodoluminescence showing complex internal patterns corresponding to growth histories. Imaging is a critical step in characterising grains prior to further geochemical analysis

Source: Milo Barham, Curtin University

THEME 1: FIND MORE RESOURCES - Distal Footprints

Ongoing Projects

Project No	Project Title	Research Organisation & Primary Contact	Sponsors	Duration (yrs)	MRIWA Contribution ($)	Total Project Value
M0436	Distal Footprint of Giant Ore Systems: Capricorn WA Case Study	CSIRO - Mineral Resources Flagship Rob Hough	CSIRO	3	2,580,000	7,580,000
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	3	175,000	341,650
M0470	Mineral systems on the margin of cratons: Albany-Fraser Orogen / Eucla Basement case study	Curtin University Chris Kirkland	Curtin University Geological Survey of Western Australia Ponton Minerals Pty Ltd	3	250,288	765,288
M0476	An Integrated Multi-Scale Study of Crustal Structure and Prospectivity of the Eastern Yilgarn Craton and Adjacent Albany-Fraser Orogen	Centre for Exploration Targeting (UWA) Michael Dentith	Geological Survey of Western Australia Yamarna South JV	2.5	312,948	652,948
M0521	Lithospheric and crustal-scale controls on multi-stage basin evolution: Impacts on Mineralising Systems	Centre for Exploration Targeting (UWA) Sandi Occhipinti	Centre for Exploration Targeting (UWA) First Quantum Minerals Ltd Fortescue Metals Group Geological Survey of Western Australia	4	733,737	1,493,737
M0530	Yilgarn 2020	Centre for Exploration Targeting (UWA)i Nicolas Thebaud	BHP Billiton Nickel West Evolution Mining Limited Gold Road Resources Ltd Newmont Goldcorp Services Pty Ltd Northern Star Resources Ltd Saracen Mineral Holdings Ltd	3	796,000	2,106,000

THEME 1: FIND MORE RESOURCES - Distal Footprints

CRC Participation

Investment
Project Value: $218 million comprised of: $50M cash from the CRC Programme $41M cash from geological surveys and from industry $49M non-staff in-kind $78M or 311FTE staff in-kind MRIWA Contribution: $1 million over 10 years

MinEx CRC

https://minexcrc.com.au/

The Challenge

Mineral and energy resources contributed ~50% of Australia's exports and ~7% of GDP in 2017-2018. The future of this contribution is at risk due to the trend of declining discovery of major, new mineral deposits.

Focus areas of MRIWA investment

Project 2: Coiled Tubing Drilling For Definition Of Mineral Deposits

Investment	Lead Research Organisation & Primary Contact
Project Cash Value: $2,165,800	University of SA, Soren Soe

Project Summary

The development of existing Coiled Tubing (CT) drilling technology suitable for the discovery and definition of mineral deposits (including brownfields, resource definition drilling and greenfields drilling to depths of >500 m). The Deep Exploration Technologies CRC (DET CRC) has previously developed a CT Rig for greenfields mineral exploration, delivering a platform for low-cost, rapid, safe and environmentally-friendly drilling, meeting key technical challenges of coil durability, drilling hard rocks with low weight-on-bit and good sample fidelity.

Project 4: Petrophysical Logging While Drilling (Lwd)

Investment	Lead Research Organisation & Primary Contact
Project Cash Value: $1,020,700	Curtin University, Brett Harris

Project Summary

The development of capacity for real-time vectoring during drilling into a new generation of lightweight coil tubing (CT) drill rigs built for the minerals industry. New geophysical logging-while-drilling (LWD) sensors and real-time subsurface reconstruction algorithms will be designed to integrate within exploration or mining workflows. The research has two linked components: (i) development of new sensors for real-time multi-parameter LWD with a CT drill rig and (ii) automatic subsurface reconstruction for steering towards a target (geo-steering) based on geophysical sensing while drilling.

Project 5: Seismic In The Drilling Workflow

Investment	Lead Research Organisation & Primary Contact
Project Cash Value: $1,291,900	Curtin University, Andrej Bona

Project Summary

The characterisation of subsurface properties with high spatial resolution using non-invasive methods is one of the "holy grails" of mineral exploration. While currently used seismic methods provide the highest resolution among the remote sensing methods, they are often considered expensive, lack direct interpretability and depth control. To fully utilise seismic measurements, there is a need to correlate them with borehole measurements. This project aims to reduce the cost and logistical difficulties associated with borehole and surface seismic acquisition to the point where it is considered a routine mineral exploration and deposit definition technique.

THEME 1: FIND MORE RESOURCES - Sub-regolith Geology

New Project Approved by the Board in 2018-2019

Evolution of Proterozoic multistage rift basins – key to mineral systems (M0554)[1]

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $2,388,576 MRIWA Contribution: $540,837 over 4 years	University of Western Australia Mark Jessell	Anglo American PLC; BHP Billiton; Independence Group NL; Teck Australia Pty Ltd

The Challenge

As the global search space, particularly for copper deposits, moves from volcanogenic deposits to those in sedimentary basins, a thorough understanding is required of the geo-dynamic history of these basins to better understand the conditions under which copper and gold mineralisation occurs including basin evolution and how associated basin fill and subsequent tectono-thermal events control fluid flow and associated focused metallogenesis of copper and gold mineralisation.

Proposed Solution

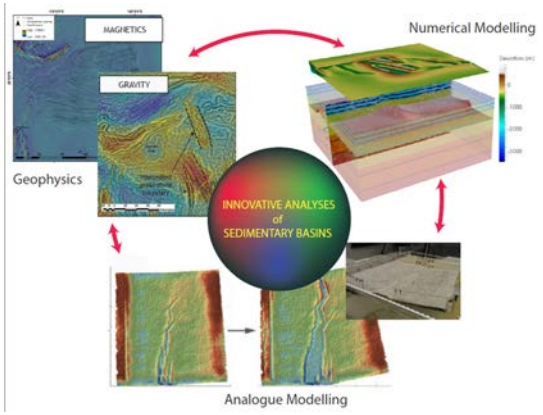
This project will deliver a new quantitative and integrated exploratory framework for the mineral industry in Australia's frontier sedimentary basins by integrating the latest advances in laboratory experimental tectonics together with thermo-mechanical numerical, surface process and geophysical modelling.

The project will use northern Australian basins as a natural laboratory and will run in parallel with the MRIWA M521 project, which is focused on understanding the Proterozoic geology of the Paterson Orogen through basin analyses and geophysical and numerical modelling.

Proposed Benefits to WA

Significant advance in understanding areas of WA which are under cover to enable a significant new search space for exploration for new world-class copper and gold deposits.

1. ARC Linkage Project Application Pending



Proposed approach for Project M0554 - Evolution of Proterozoic multistage rift basins – key to mineral systems

Source: Mark Jessell, University of Western Australia

THEME 1: FIND MORE RESOURCES - Sub-regolith Geology

Ongoing Projects

Project No	Project Title	Research Organisation & Primary Contact	Sponsors	Duration (yrs)	MRIWA Contribution ($)	Total Project Value ($)
M0424	Multiscale Dynamics of Hydrothermal Mineral Systems	University of Western Australia Alison Ord	AngloGold Ashanti Australia Ltd First Quantum Minerals (Australia) Pty Ltd Geological Survey of Western Australia Silver Lake Resources	4	210,000	630,000
M0448	4D Evolution of WA Ore Systems (WA4D): Rutile - pathfinder to ores	Curtin University Neal McNaughton	Curtin University Geological Survey of Western Australia Independence Group NL	3	263,113	489,763
M0465	Deep crustal-scale structure, geological evolution and multi-commodity prospectivity analysis in the Halls Creek Orogen, Kimberley region, Western Australia	University of Western Australia Sandi Occhipinti	Savannah Nickel Mines Pty Ltd	3	33,445	45,945

THEME 1: FIND MORE RESOURCES - Dataset Correlation

Ongoing Projects

Project No	Project Title	Research Organisation	Sponsors	Duration (yrs)	MRIWA Contribution ($)	Total Project Value ($)
M0493	Don't Bury Western Australia's Geophysical Data: Uncovering Prospective Mineral Terrains with Regional Potential Field, Seismic and MT transects through cooperative inversion	Curtin University Brett Harris	DET CRC sponsorship held by Curtin University	1.5	125,300	257,900

THEME 2: EXPAND THE MINING ENVELOPE - Deep Extraction Systems

New Project Approved by the Board in 2018-2019

Towards a Mechanistic Understanding of Electrokinetic In-Situ Leaching (M0544)

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $842,605 MRIWA Contribution: $290,605 over 3 years	University of Western Australia Andy Fourie	BHP Billiton Evolution Mining Limited Newcrest Mining Limited Newmont Mining Services Pty Ltd

The Challenge

In-situ leaching coupled with electrokinetics (EK-ISL) potentially enables recovery of metals from (sub-economic) ores with a smaller environmental footprint than current mining approaches.

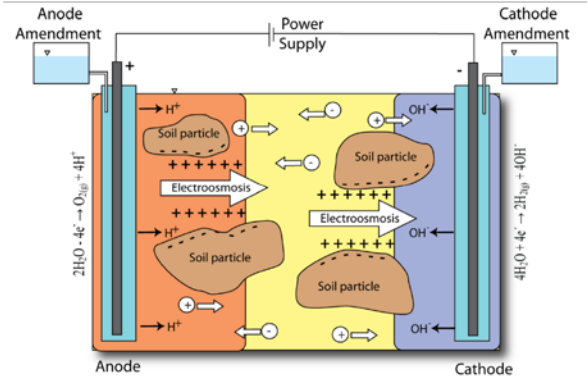
A more refined process understanding of the EK-ISL system in relation to the potential on liberating and recovering gold and other metals such as copper is required.

Proposed Solution

1. Identification of the impacts from mineralogy, sample size, extraction conditions and reaction chemistry on the rate and magnitude of metal recovery.
2. Quantification of the reactions and physical transport processes that occur under laboratory conditions
3. Assessment of the critical controls and overall feasibility of EK-ISL operations from a technical and economical perspective.

Proposed Benefits to WA

Sophisticated ISR techniques will be key to exploiting deep, sedimentary-based deposits, such the world-class copper deposit located in the Patterson Basin.



Principles of electrokinetic transport: electro-osmosis and electromigration, electrolysis reactions and movement of the resulting acid and base fronts

Source: Wu, M.Z., 2011. Electrokinetic In-Situ Chemical Oxidation Remediation of Low- Permeability Aquifer Systems: From Processes and Parameters to Implementation. University of Western Australia. as reported in Martens E (2019) Feasibility of electrokinetic in-situ leaching. MRIWA Report 450 – released 2019-20

THEME 2: EXPAND THE MINING ENVELOPE - Deep Extraction Systems

Ongoing Projects

Project No	Project Title	Research Organisation	Sponsors	Duration (yrs)	MRIWA Contribution ($)	Total Project Value ($)
M0431	Ground Support Systems Optimisations (GSSO)	ACG - Australian Centre for Geomechanics	Atlas Copco Rock Drilling Tools Division CODELCO - (Div Casa Matriz) Dywidag-Systems International Pty Ltd Fero Strata Systems Pty Ltd GeoBrugg AG Switzerland Golder Associates Pty Ltd Independence Group NL Jennmar Australia Pty Ltd MMG Ltd Mount Isa Mines Ltd (Xstrata Zinc)	4	240,000	1,560,000

THEME 2: EXPAND THE MINING ENVELOPE - Engineering in Complex Rock Masses

Ongoing Projects

Project No	Project Title	Research Organisation & Primary Contact	Sponsors	Duration (yrs)	MRIWA Contribution ($)	Total Project Value ($)
M0464	Rock properties to predict rockburst vulnerability in three dimensions	ACG - Australian Centre for Geomechanics Phil Dight	ACG - Australian Centre for Geomechanics Agnew Gold Mining Company Pty Ltd (Gold Fields) Agnico Eagle Mines Ltd AngloGold Ashanti Australia Limited Ernest Henry Mining Gold Fields Australia GSM Mining Company Pty Ltd (Gold Fields Australia) Iamgold Mine Westwood Newcrest Mining Limited Northern Star Kanowna Pty Ltd - NSR Ltd St Ives Gold Mining Company Pty Ltd (Gold Fields) Tritton Resources Limited	4	1,100,000	2,140,000
M0487	Hard rock disc cutting technologies: Fundamentals of cutter/rock interaction and rock failure mechanism	CMTE Development (trading as Mining3) Sevda Dekhoda	CMTE Development (trading as Mining3)	3	200,000	550,000
M0489	Probabilistic Stope Design	ACG - Australian Centre for Geomechanics Yves Potvin	Agnico Eagle Mines Ltd Glencore Mt. Isa Mines Gold Fields Australia Hecla Québec - Bureau Administratif Val-d'Or	2	85,000	430,000

Project No	Project Title	Research Organisation & Primary Contact	Sponsors	Duration (yrs)	MRIWA Contribution ($)	Total Project Value ($)
M0497	Ground Support Systems Optimisation - Phase 2	ACG - Australian Centre for Geomechanics Yves Potvin	ACG - Australian Centre for Geomechanics Agnew Gold Mining Company Pty Ltd (Gold Fields) Agnico Eagle Mines Ltd Cadia Holdings Pty Ltd (Newcrest) Dywidag-Systems International Pty Ltd Fero Strata Systems Pty Ltd Garock Iamgold Mine Westwood Independence Group NL Jennmar Australia Pty Ltd New Concept Mining Sandvik Mining and Rock Technology St Ives Gold Mining Company Pty Ltd (Gold Fields)	3	671,250	1,931,250
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	250,000	850,850

THEME 2: EXPAND THE MINING ENVELOPE - Engineering in Complex Rock Masses

CRC Participation

Investment

Project Value:
$137.7 million comprised of:
$34.4 million cash from the CRC Programme
$42.5 million cash from Researchers, METS Companies and Mining Industry
$29.8 million non-staff in-kind
$31 million or 115.9 FTE staff in-kind

MRIWA Contribution:
$600,000 over 6 years

https://crcore.org.au/

The Challenge

CRC ORE aims to transform the minerals sector by deploying innovative world-class technology to effect a step change in value across the whole-of-mine system. It aims to 'Optimise Resource Extraction' through site implementation of innovation to improve overall productivity.

Focus areas of MRIWA investment

Project: Integration of Enhanced Grade Engineering Grade by Size Gangue Liberation and More Energy Efficient Comminution (M0503)

Investment	Lead Research Organisation & Primary Contact
Project Cash Value: $901,748	CRC ORE, Paul Revell

Project Summary

This project aims to undertake extensive laboratory-based research into enhancing coarse liberation through controlled energy application using next generation VSI technologies for a range of selected ores and operations.

Project: GE.VIEW.WA - Developing New Tools and Resources for Benchmarking Grade Engineering® Opportunity for the WA Gold Mining Industry (M0485)

Investment	Lead Research Organisation & Primary Contact
Project Cash Value: $146,000	CRC ORE, Paul Revell

Project Summary

The GE.View tool uses predictive modelling of heterogeneity to identify Grade Engineering opportunities in the Western Australian minerals industry from public domain data.

Project: On-belt Gamma Activation Analysis (GAA) Sensing for Gold: Phase 2 - Buildable Prototype Design and Laboratory Testing of Components (M0500) and Phase 3 - Preparation for Pilot Plant Campaign (M0534)

Investment	Lead Research Organisation & Primary Contact
Projects Cash Value: $671,000	CRC ORE, Paul Revell

Project Summary

The aim of these Projects is to produce a buildable, costed design for a 60tph GAA on-belt gold ore sensing pilot facility validated by direct performance measurement of components and extensive modelling, and whose principal components: Linac (high power X-ray source), detector array, radiation conveyor, and main shield could directly translate to a site-based trial at a production ore feed rate.

THEME 2: EXPAND THE MINING ENVELOPE - Deep In-mine Environments

Ongoing Projects

Project No	Project Title	Research Organisation & Primary Contact	Sponsors	Duration (yrs)	MRIWA Contribution ($)	Total Project Value ($)
M0499	Establishing the in-situ rock bolt behaviour underground in order to model and design improved rock bolt support systems	CMTE Development (trading as Mining3) Ernesto Villaescusa	CMTE Development (trading as Mining3) Curtin University Peabody Energy Australia Pty Ltd	3	400,000	1,270,000

THEME 3: INCREASE RECOVERABLE VALUE - Accelerated Technology Development Frameworks

New Projects Approved by the Board in 2018-2019

Grade Engineering Investigation on the Relationship between Ore Grade and Size Fraction in the Kalgoorlie-Boulder Region (M0441f)

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $83,800 MRIWA Contribution: $43,000 over 0.5 years	CRC ORE Jon Rutter	CRC ORE

The Challenge

While small to medium size gold and nickel miners in the Greater Goldfields region are trying to improve productivity and increase the amount of metal recovered from their operations through particle sorting, a full metal balance on samples being tested through a particle sorter is not being conducted.

By disregarding metal deportment in all size fractions, it is not possible to assess the value proposition of this approach and whether the upgrading impact obtained is due to particle sorting or sample preparation screening processes.

Proposed Solution

Development of a natural deportment database, populated with samples from different geological styles and mineralogical signatures within the Western Australian Goldfields. This database can then be used to identify potential deposits and deposit styles that are:

- amenable to natural grade by size deportment.
- likely to deliver maximum benefit when natural deportment is integrated with particle sorting.
- non-amenable to screening and/or particle sorting options.

Proposed Benefits to WA

A better understanding of deportment of value within their deposits for small to medium producers in the greater Goldfields region of WA, resulting in higher efficiency of metal recovery.

Integrated Screening and Particle Sorting (ISPS) Collaborative Study (M0441g)

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $301,210 MRIWA Contribution: $50,000 over 0.5 years	CRC ORE Greg Wilkie	CRC ORE

The Challenge

While particle sorting is a technique that may be utilised to upgrade ores, what commonly fails to be taken into consideration is the benefit of first assessing the natural deportment of metal to a particular size fraction (normally the fines fraction) through grade-by-size screening test work, prior to undertaking particle sorting test work.

Missing this step risks particle sorting test results being misinterpreted as being representative of the full sample without considering the mass balance impact of high grade material that might have been lost in the fines fraction not detected through the particle sorter and loss of opportunity to upgrade feed first through determining if there is a concentration of high grade to the fine (or coarse) fraction which can be separated through screening.

Proposed Solution

Development of a framework for undertaking integrated screening and particle sorting (ISPS) projects including an assessment of operational impacts, economic valuation and implementation approaches, enabling participants to further evaluate Integrated Screening & Particle Sorting projects on other ore domains within their site.

Proposed Benefits to WA

A better understanding of the value of particle sorting to upgrade mill feed, particularly when combined with grade-by-size screening.

Lixiviant access creation in impermeable hard rock mass for the in-situ underground leaching of metals from ore (M0529)

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $120,000 MRIWA Contribution: $25,000 over 3 years	Murdoch University Aleks Nikoloski	CMTE Development (trading as Mining3) Murdoch University

The Challenge

No commercial processes exist for the In-Situ Recovery (ISR) (also referred to as in-situ leaching or solution mining) of commodities such as copper, gold and nickel, due to the limitations for the application of ISR for recovery of these metals given the low permeability of the hard rock matrix that hosts the valuable minerals.

Proposed Solution

Lixiviant access to mineral particles must be provided to enable leaching of the values.

Possible microscale fracture-creation methods including the use of cryogenic or supercooled fluids, such as liquid nitrogen, microwave fracturing and high-voltage fracturing will be investigated in this project.

Proposed Benefits to WA

Improved understanding of options for generating pathways for lixiviant contact with value minerals as the basis for in-situ value extraction from underground orebodies has the potential to unlock new resources and deliver environmental benefits.

Furthermore, the in-situ permeability measurement techniques that could be developed in this study may prove beneficial not only in ISR applications, but may also be useful and effective more widely in the mining sector.

The effect of water quality on rare earth minerals flotation (M0537)

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $210,500 MRIWA Contribution: $70,000 over 3.5 years	Curtin University Bogale Tadesse	Mt Weld Mining Pty Ltd Curtin University

The Challenge

To investigate the effects of using impure water on the flotation of rare earth bearing minerals as an alternative to using high-cost reverse osmosis water for processing.

Proposed Solution

1. Understand the effect of water quality variation on flotation recovery and grade of rare earth minerals.
2. Understand the interactions and efficiency of flotation reagents in impure water.
3. Understand how impure water affects the flotation behaviour of target and gangue minerals.
4. Understand the tolerance for impurities while achieving the desired flotation efficiency.
5. Identify less expensive water treatment options to produce suitable water for REO flotation.

Proposed Benefits to WA

Reduction in the requirement for, and consumption of, high-quality water, particularly in locations where water is scarce, potentially decreasing operating costs for companies.

Completed Projects in 2018-2019

Investigation of Ore Settling in Molten Chloride Salts (M0477)

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $92,000 MRIWA Contribution: $28,000 over 2 years	University of South Australia Frank Bruno	Centrex Metals Ltd Department of State Development South Australia, Mining and Petroleum Services Centre of Excellence University of South Australia

The Challenge

Centrex Potash Pty Ltd was developing the Oxley Potash project in WA with a key focus on high temperature molten chloride salt roast of potassium feldspar, followed by cooling before separation and recycling of unreacted salt and production of potassium chloride. If the separation processes could be undertaken while still molten, the energy, salt, and water savings for the process would provide a step change in performance.

The research was proposed in two stages:

- Stage 1: achieve a separation of reacted potassium feldspar ore from molten salt, with a high separation efficiency
- Stage 2: If successful, research, design, fabrication and testing of small scale trial separation equipment units for the main process components to follow, overcoming the difficulties of highly corrosive and high temperature molten salt.

Key Findings

The experimental work and research in Stage 1 concluded a satisfactory separation of the reacted potassium feldspar ore from the molten salt could not be achieved with a high separation efficiency. The Sponsors and researchers therefore decided not to proceed to Stage 2.

Benefits to WA

Highlighting future directions of research which may provide greater benefits for the removal of potassium or other elements using the molten salt methodology.

Solution purification and valuable by-products formation during the production of battery-grade lithium from micas (M0479)

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $195,632 MRIWA Contribution: $95,632 over 0.75 years	Murdoch University Aleks Nikoloski	Lithium Australia NL Venus Metals Corporation Pty Ltd

The Challenge

How chemical process conditions could be optimised to separate impurities, resulting in a purified lithium product liquor.

Key Findings

- Identification of the key process parameters, including the type of reagents used, reagent dosages, effects of seeding and electrochemical conditions in each process unit of the flow sheet. These parameters extended to the rates and extents of precipitation of the relevant impurities and their influence on the lithium deportment.
- How the loss of lithium could be minimised during the purification process by carefully identifying the characteristics of all the solid chemical compounds produced in this process and determining how much lithium sticks to each compound.
- A number of potentially valuable by-products identified, including potassium sulphate, caesium, rubidium, sodium silicate and high-grade gypsum, requiring further investigation of relevant process options.

Benefits to WA

- Being able to extract battery-grade lithium carbonate from a previously unused resource, micas containing lithium, will significantly boost the state's supply of battery minerals.
- Identification of ways to lower the cost and environment footprint of lithium production through the reuse of certain critical reagents such as alunite and fluorite.

THEME 3: INCREASE RECOVERABLE VALUE - Accelerated Technology Development Frameworks

Ongoing Projects

Project No	Project Title	Research Organisation & Primary Contact	Sponsors	Duration (yrs)	MRIWA Contribution ($)	Total Project Value ($)
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 Jacques Eksteen	Curtin University Savannah Nickel Mines Pty Ltd	3.5	200,000	510,860
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	100,500	239,364
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 Ltd. Sandfire Resources NL	2	265,000	700,000
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 Inc. Environmental Copper Recovery 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 Ltd (Gold Fields)	3	240,000	900,000

THEME 4: IMPROVE PRODUCTIVITY - Productivity Optimisation

New Projects Approved by the Board in 2018-2019

Organic Acid Leach System for Rare Earth Extraction Technology Development (M0541)

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $345,160 MRIWA Contribution: $115,000 over 4 years	Curtin University Laurence Dyer	Mt Weld Mining Pty Ltd Curtin University

The Challenge

WA monazite ore is conventionally extracted via high temperature conversion with concentrated corrosive reagents that often emits hazardous by-products.

Current research has proven the concept that a WA monazite sample can be leached using two-stage organic acid leach process using more benign reagents and under atmospheric conditions.

These stages have been conducted in isolation, however, for a legitimate process to be developed, a continuous flowsheet must be designed involving several linkages and recycle steps.

Proposed Solution

Development of a continuous flowsheet to optimise the key stages of the low temperature extraction and develop the interconnecting processes.

Proposed Benefits to WA

Potential for greater proportion of monazite ore processing to be conducted onshore in Western Australia.

Field-based XRF for prompt Au analysis (M0543)

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $658,000 MRIWA Contribution: $218,000 over 1 year	Portable PPB Pty Ltd Simon Bolster	Barrick Gold Corp Bellevue Gold Ltd Centerra Gold Fosterville Gold Mines Ltd St Ives Gold Mining Company Pty Ltd (Gold Fields) Gold Road Resources Ltd Newcrest Mining Ltd Perseus Mining

The Challenge

Mining companies have turn-around periods for analytical data for samples ranging from a few days to many weeks due to sending samples away to laboratories when doing gold exploration. This results in inefficient exploration practices and higher costs especially when exploring the more remote parts of WA away from traditional laboratories.

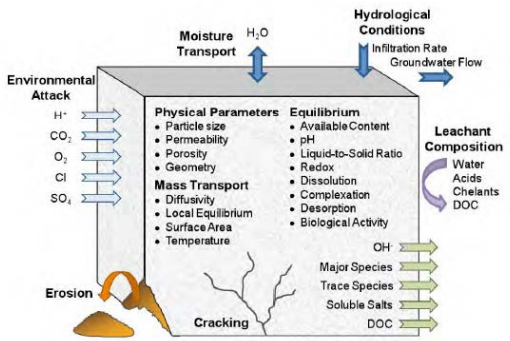
Proposed Solution

In-field analysis of samples using *detectORE*, capable of achieving sensitivities of assay to approximately 10 ppb gold.

Proposed Benefits to WA

The proposed technology and research will:

- Speed up analytical procedure
- Reduce exploration costs
- Improve exploration efficiencies increasing the potential for future gold discoveries in WA
- Formation of a new WA based METS company



Internal and external factors influencing the extent and rate of leaching of a chemical constituent from a solid particle into a contacting aqueous solution

Source: Garrabrants AC, Kosson DS, van der Sloot HA, Sanchez F, and Hjelmar O (2010) Background information for the Leaching Environmental Assessment Framework (LEAF) test methods. US EPA Report EPA-600/R-10/170 *as reported in* Sharma R, Allen D, Black S, Price B and Rothnie N (2018) Validation and Standardisation of Sequential Leaching Tests to Better Predict the Impact of Mining on Ground and Surface Water Quality. MRIWA Report No 432

Completed Project in 2018-2019

Validation and standardisation of sequential leaching tests to better predict the impact of mining on ground and surface water quality (M0432)

Investment	Research Organisation & Primary Contact	Sponsors
Project Value: $216,360 MRIWA Contribution: $85,360 over 2 years	ChemCentre Silvia Black	BHP Billiton Iron Ore

The Challenge

Current chemical and mineralogical methodologies used to characterise waste rocks, and the long-term impact of mining on ground and surface water quality, were either 'unfit for purpose' or, in the case of long-term kinetic leaching studies, taking too long to complete and unduly delaying the Environmental Impact assessment (EIA) if the completion of such studies were mandatory.

Key Findings

A sequential leaching procedure was developed and optimised to meet the requirements for assessing potentially problematic mine waste produced by iron ore mining activities, focusing on those that have low sulfur concentration and/or are of complex mineralogy.

Benefits to WA

The decision support tool developed to support the application of the optimised sequential leaching test as a screening tool for early identification of risks can be used to direct and prioritise longer term kinetic studies subsequent to, or as a condition of, the Environmental Impact Assessment, waste management and mine-site closure planning and approval.

THEME 4: IMPROVE PRODUCTIVITY - Productivity Optimisation

CRC Participation

CRC for Achieving Sustainable Mine Closure

Investment

Project Value: still to be determined

MRIWA Contribution:
- $10,000 to support the development of the Stage 1 bid
- In-principle $310,000 over 10 years if bid successful

The Challenge

Investment in mining and post-mining projects requires certainty in order to make informed decisions about the associated risks and costs, while effective planning for and delivery of post-mining futures can build social, economic and environmental value.

Innovation in this area enables the Australian Mining Equipment, Technology and Service (METS) companies to capture the growing billion dollar global market in environmental restoration.

Proposed Research Themes

1. Regional Economic Development: systems that will enable co-development of post-mine futures by providing stakeholders with the capacity to consider and plan for post-mine land uses and capitalise on prior investments.
2. Risk, Valuation and Decision-Making: new risk assessment and evaluation tools for mining companies that better inform investment and planning decisions and can integrate a broader range of post-mine outcomes.
3. Operational Solutions: deliver new solutions for METS and mining companies that target high-risk points in the mining value chain and bottlenecks in the supply chain to deliver post-mine landscapes that increase the chance of relinquishment

A national network of demonstration sites and mine planning and data integration theme will be established to facilitate research integration and commercialisation.

Further information can be located here[1]

1. https://wabsi.org.au/our-work/projects/crc-resource-sector-environmental-management/

Mining Industry 4.0 CRC

Investment

Project Value: still to be determined

MRIWA Contribution:
- $30,000 to support the development of the Stage 1 bid

The Challenge

Mining Industry 4.0 CRC (MI4 CRC) will create and deploy connected and interoperable solutions across the entire value chain for the mining sector to drive increased productivity, competitiveness, capability and sustainability of the Australian mining industry.

Proposed Research Themes

1. Robust data Integrity (from data to information) - data fusion, cyber security and resilience, data quality, quantified risk assessment, digital twins, orebody modelling, minerals processing, probabilistic & causal modelling, artificial intelligence (AI) and machine learning.
2. Integration & Interoperability Framework (from information to knowledge) - interoperability solutions, open platforms & architectures, 'plug and play' mining systems, standardisation and guidelines, systems engineering, human machine interfaces, digital twins, trusted autonomous systems, orebody modelling, and minerals processing.
3. Solutions development & Implementation (putting knowledge into action) - agile change management, product design, social adaption to Mining Industry 4.0, digital twins, systems engineering, trusted autonomous mining systems, value chain driven decisions, organisation model structure to support transition, human machine interfaces, automated planning, mathematical optimisation, control, AI & human-machine co-learning.
4. Digital Intelligence ecosystem (growing digital capability) - This program concerns education and training (E&T) and innovative new learning techniques for growing digital capability and attracting a future digitally skilled workforce.

Further information can be located here[2]

2. https://eng.unimelb.edu.au/industry/melbourne-mining-integrator/mi4-crc

THEME 4: IMPROVE PRODUCTIVITY - Productivity Optimisation

Ongoing Projects

Project No	Project Title	Research Organisation & Primary Contact	Sponsors	Duration (yrs)	MRIWA Contribution ($)	Total Project Value ($)
M0449	DROP PROBE SYSTEM – RC LWD (Reverse Circulation Log-While-Drilling)	Globaltech Corporation Pty Ltd Gordon Stewart	Boart Longyear Globaltech Corporation Pty Ltd	0.75	150,000	300,000
M0450	Feasibility of Electrokinetic in-situ Leaching *Project linked to Scholarship Project 455 by Evelien Martens*	University of Western Australia Andy Fourie	-	2	50,000	50,000
M0478	Mine Pit Lakes – Their Characterisation, Assessment, Management and Value as Potential Lead Indicators for In-Situ Metal Recovery Opportunities	ChemCentre Silvia Black	CRC CARE	2	220,000	550,000
M0482	Development and Evaluation of Fume Free Explosives for Underground Blasting Applications	CMTE Development (trading as Mining3) Italo Onederra	Barrick Gold Corporation Newcrest Mining Limited Northern Star Resources Limited	1	84,000	210,000
M0495	A Study of Nano Diesel Particulate Matter (nDPM) Behaviour and Physico-chemical Changes in Underground Hard Rock Mines of Western Australia	ChemCentre Silvia Black	Department of Mines and Petroleum	1	166,120	516,120
M0498	Wearable Technologies for Safety	Soter Analytics Matthew Hart	Roy Hill	0.8	25,000	50,000
M0507	QA4UAV - A standard workflow to quality assure UAV products	CRC SI Nathan Quadros	CRC SI Department of Environment Land Water and Planning	1	75,000	250,000

Project No	Project Title	Research Organisation & Primary Contact	Sponsors	Duration (yrs)	MRIWA Contribution ($)	Total Project Value ($)
M0510	Safe, sustainable management of filtered tailings	University of Western Australia Andy Fourie	Alcoa of Australia Ltd Alumina Quality Workshop Inc BHP Billiton Group Operations Pty Ltd International Aluminium Institute Rio Tinto Technological Resources Pty Ltd	3	142,000	482,500
M0513	Extension to M432 - 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 Billiton Iron Ore CRC CARE Rio Tinto Iron Ore Fortescue Metals Group	2.5	216,000	525,000
M0515	Development of drilling fluid system for Coiled tube drill rig	Curtin University Masood Mostofi	Curtin University DET CRC	1	150,000	400,000

THEME 5: DEVELOP NEW PRODUCTS AND MARKETS - New Mineral Products

Ongoing Projects

Project No	Project Title	Research Organisation & Primary Contact	Sponsors	Duration (yrs)	MRIWA Contribution ($)	Total Project Value ($)
M0451	Establishing Leaching Environmental Impact Assessment Tools in the Development of a WA Framework for By-product Re-use and Classification	ChemCentre Silvia Black	Alcoa World Alumina Iluka Resources Water Corporation	2	144,130	414,130

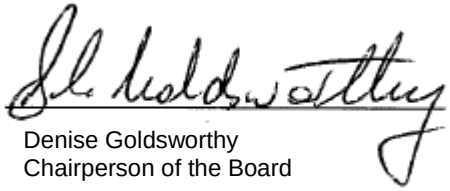
Financial Statements and Notes

Certification of Financial Statements

For the year ended 30 June 2019

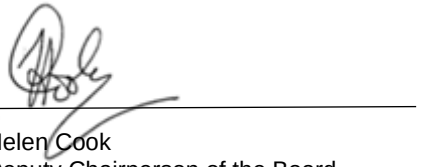
The accompanying financial statements of the Minerals Research Institute of Western Australia ('MRIWA') have been prepared in compliance with the provisions of the *Financial Management Act 2006* from proper accounts and records to present fairly the financial transactions for the financial year ended 30 June 2019 and the financial position as at 30 June 2019.

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.



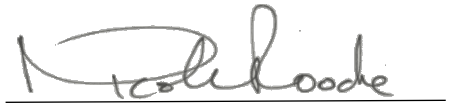
Denise Goldsworthy
Chairperson of the Board

Date: 13 August 2019



Helen Cook
Deputy Chairperson of the Board

Date: 13 August 2019



Nicole Roocke
Chief Financial Officer

Date: 13 August 2019

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

Opinion
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 2019, 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 2019 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 Responsibilities 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 agency'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.

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.

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As part of an audit in accordance with Australian Auditing Standards, I exercise professional judgment and maintain professional scepticism throughout the audit. I also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for my opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the agency's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the Board.
- Conclude on the appropriateness of the Board's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the agency's ability to continue as a going concern. If I conclude that a material uncertainty exists, I am required to draw attention in my auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify my opinion. My conclusions are based on the audit evidence obtained up to the date of my auditor's report.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

I communicate with the Board regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that I identify during my audit.

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 Board 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 2019.

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.

Independent Auditor's Report (continued)

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 the controls, necessary to achieve the overall control objectives, were implemented as designed.

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 2019. The key performance indicators are the key effectiveness indicators and the 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 2019.

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 key 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 agency'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 2019 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 refer to the hard copy of the audited financial statements and key performance indicators to confirm the information contained in this 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
15 August 2019

Statement of Comprehensive Income

For the year ended 30 June 2019

	Notes	2019 $	2018 $
COST OF SERVICES			
Expenses			
Research grants		3,898,268	3,396,536
Scholarships		205,424	164,298
Employee benefits expense	2.1.1	587,398	542,640
Institute Contractor fees		132,312	127,551
Board and committee fees and costs	2.2	106,627	102,099
Supplies and services	2.3	414,389	224,229
Other expenses	2.3	96,647	25,274
Accommodation expenses		59,250	47,250
Depreciation expense	4.1	2,894	3,617
Total cost of services		**5,503,209**	**4,633,494**
Income			
Revenue			
Interest revenue		276,093	230,163
Other revenue		33,176	46,009
Revenue from Industry Sponsorship		2,030,952	1,353,193
Total Revenue		**2,340,221**	**1,629,365**
Total income other than income from State Government		**2,340,221**	**1,629,365**
NET COST OF SERVICES		**3,162,988**	**3,004,129**

	Notes	2019 $	2018 $
Income from State Government	3.1		
State Government Grant		3,128,000	4,109,000
Resources received free of charge		59,250	47,250
Total income from State Government		**3,187,250**	**4,156,250**
SURPLUS/(DEFICIT) FOR THE PERIOD		**24,262**	**1,152,121**
TOTAL COMPREHENSIVE INCOME FOR THE PERIOD		**24,262**	**1,152,121**

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

Statement for Financial Position

As at 30 June 2019

	Notes	2019 $	2018 $
ASSETS			
Current Assets			
Cash and cash equivalents	6.1.1	4,445,788	6,766,981
Restricted cash and cash equivalents	6.1.2	8,795,675	6,063,798
Receivables and other assets	5.1	769,918	569,036
Other current assets	5.2	98,167	65,044
Total Current Assets		**14,109,548**	**13,464,859**
Non-Current Assets			
Office Equipment	4.1	11,577	14,471
Total Non-Current assets		**11,577**	**14,471**
TOTAL ASSETS		**14,121,125**	**13,479,330**

	Notes	2019 $	2018 $
LIABILITIES			
Current Liabilities			
Payables	5.3	370,952	398,010
Employee benefit provisions	2.1.2	31,028	105,400
Deferred revenue	5.4	3,079,025	2,373,009
Total Current Liabilities		**3,481,005**	**2,876,419**
Non-Current Liabilities			
Employee benefit provisions	2.1.2	18,467	5,520
Total Non-Current Liabilities		**18,467**	**5,520**
TOTAL LIABILITIES		**3,499,472**	**2,881,939**
NET ASSETS		**10,621,653**	**10,597,391**
EQUITY	8.8		
Accumulated surplus		10,621,653	10,597,391
TOTAL EQUITY		**10,621,653**	**10,597,391**

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 2019

	Notes	Accumulated Surplus $
Balance at 1 July 2017	8.8	9,445,270
Surplus for the period		1,152,121
Balance at 30 June 2018		**10,597,391**
Balance at 1 July 2018	8.8	10,597,391
Surplus for the period		24,262
Balance at 30 June 2019		**10,621,653**

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 2019

	Notes	2019 $	2018 $
CASH FLOWS FROM STATE GOVERNMENT			
State Government Grant		3,128,000	4,109,000
Net cash provided by State Government		**3,128,000**	**4,109,000**
Utilised as follows:			
CASH FLOWS FROM OPERATING ACTIVITIES			
Payments			
Research Grant Payments		(4,196,232)	(3,794,470)
Employee benefits		(592,976)	(520,645)
Institute Contractor fees		(132,312)	(127,551)
Board and Advisory committee fees		(26,142)	(34,990)
Supplies and Services		(585,305)	(237,369)
GST payments on Purchases		(355,455)	(267,068)
Receipts			
Receipts from Sponsors		2,488,456	2,305,020
Interest received		279,565	220,484
GST receipts on sales		155,515	134,885
GST receipts from taxation authority		247,570	97,049
Net cash used in operating activities		**(2,717,316)**	**(2,224,655)**
Net increase in cash and cash equivalents		410,684	1,884,345
Cash and cash equivalents at the beginning of the period		12,830,779	10,946,434
CASH AND CASH EQUIVALENTS AT THE END OF THE PERIOD	6.1.1	**13,241,463**	**12,830,779**

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

Notes to the Financial Statements

For the year ended 30 June 2019

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 12 August 2019.

Statement of compliance

These general purpose financial statements are prepared in accordance with:

1) The *Financial Management Act 2006* **(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* 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.

Contributed equity

AASB Interpretation 1038 *Contributions by Owners Made to Wholly-Owned Public Sector Entities* requires transfers in the nature of equity contributions, other than as a result of a restructure of administrative arrangements, to be designated by the Government (the owner) as contributions by owners (at the time of, or prior to, transfer) before such transfers can be recognised as equity contributions. Capital appropriations have been designated as contributions by owners by TI 955 Contributions by Owners made to Wholly-Owned Public Sector Entities and have been credited directly to Contributed Equity.

The transfers of net assets to/from other agencies, other than as a result of a restructure of administrative arrangements, are designated as contributions by owners where the transfers are non-discretionary and non-reciprocal.

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	2019 $	2018 $
Research grants		3,898,268	3,396,536
Scholarships		205,424	164,298
Employee benefits expenses	2.1.1	587,398	542,640
Employee benefits provisions	2.1.2	49,495	110,920
Board and committee fees and costs	2.2	106,627	102,099
Other expenses	2.3	511,036	249,503

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.

2.1.1 Employee benefits expenses

	2019 $	2018 $
Wages and salaries	532,534	498,337
Superannuation - defined contribution plans[(a)]	54,864	44,303
	587,398	**542,640**

(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. The employer contribution paid to the Government Employees Superannuation Board (GESB) in respect of the GSS is paid back into the Consolidated Account by the GESB.

GSS (concurrent contributions) is a defined benefit scheme for the purposes of employees and whole-of-government reporting. It is however a defined contribution plan for agency purposes because the concurrent contributions (defined contributions) made by the Institute to GESB extinguishes the Institute's obligations to the related superannuation liability.

The Institute does not recognise any defined benefit liabilities because it has no legal or constructive obligation to pay future benefits relating to its employees. The Liabilities for the unfunded Pension Scheme and the unfunded GSS transfer benefits attributable to members who transferred from the Pension Scheme, are assumed by the Treasurer. All other GSS obligations are funded by concurrent contributions made by the Institute to the GESB.

The GESB and other fund providers administer public sector superannuation arrangements in Western Australia in accordance with legislative requirements. Eligibility criteria for membership in particular schemes for public sector employees vary according to commencement and implementation dates.

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.*

	2019 $	2018 $
Current		
Employee benefits provision		
Annual leave[(a)]	14,127	24,618
Long service leave[(b)]	16,901	80,782
	31,028	**105,400**
Non-Current		
Employee benefits provision		
Long service leave[(b)]	18,467	5,520
	18,467	**5,520**

(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.

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.

2.2 Board and committee fees and costs

	2019 $	2018 $
Board of Directors' remuneration	83,582	79,716
Advisory Committee attendance fees	15,439	18,947
Board and Advisory Committee's expenses	7,606	3,436
	106,627	**102,099**

2.3 Other expenditure

	2019 $	2018 $
Supplies and services		
Printing and stationery	1,133	1,671
Communications	26,710	46,901
Business travel	11,985	20,396
Accounting services	131,870	88,362
Consultants	165,952	13,636
Legal services	23,598	12,996
Insurance	6,043	12,253
Sponsorships	5,599	6,000
Other	41,499	22,014
Total supplies and services	**414,389**	**224,229**
Other expenses		
Audit fees	18,900	18,650
Bad debts expense	22,000	24
Employee expenses	39,206	-
Employee on-costs	11,524	6,600
Office fit out	5,017	-
	96,647	**25,274**
Total other expenses	**511,036**	**249,503**

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.

Bad debts expense: Bad debts expense was recognised as the movement in the allowance for doubtful debts.

Employee on-costs: Includes workers' compensation insurance. Superannuation contribution 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	2019 $	2018 $
Income from State Government	3.1	3,187,250	4,156,250

3.1 Income from State Government

	2019 $	2018 $
State Government Grants	3,128,000	4,109,000
	3,128,000	**4,109,000**

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

	2019 $	2018 $
Department of Mines, Industry Regulation and Safety	59,250	47,250
	59,250	**47,250**
	3,187,250	**4,156,250**

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.

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	2019 $	2018 $
Office equipment	4.1	11,577	14,471

4.1 Office Equipment

	2019 $	2018 $
Office equipment		
At cost	33,480	33,480
Accumulated depreciation	(21,903)	(19,009)
	11,577	**14,471**
Office equipment		
Carrying amount at start of period	14,471	18,088
Depreciation	(2,894)	(3,617)
Carrying amount at end of period	**11,577**	**14,471**

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 accumulate 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. 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.

Where a previously revalued asset is written down to its recoverable amount, an impairment loss is recognised as a revaluation decrement through other comprehensive income.

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	2019 $	2018 $
Receivables	5.1	769,918	569,036
Other current assets	5.2	98,167	65,044
Payables	5.3	370,952	398,010
Deferred revenue	5.4	3,079,025	2,373,009

5.1 Receivables

	2019 $	2018 $
Current		
Grant receivables - Sponsorship	723,058	449,042
Less: provision for doubtful debts	(22,000)	-
	701,058	449,042
GST receivable	68,860	119,994
	769,918	**569,036**

Trade receivables are recognised at original invoice amount less an allowance for any uncollectible amounts (i.e. impairment). The collectability of receivables is reviewed on an ongoing basis and any receivables identified as uncollectible are written off against the allowance account. The carrying amount is equivalent to fair value as it is due for settlement within 30 days.

5.2 Other current assets

	2019 $	2018 $
Accrued Interest	61,572	65,044
Prepayments	1,464	-
Other receivables	35,131	-
	98,167	**65,044**

Revenue is recognised when the interest accrues.

5.3 Payables

	2019 $	2018 $
Current		
Research grants payable	66,000	189,860
Payables	-	16,899
Accrued research grants	201,250	134,799
Accrued general expenses	101,749	54,440
Accrued salaries	1,953	2,012
	370,952	**398,010**

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. The Institute considers the carrying amount of accrued salaries to be equivalent to its fair value.

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 revenue

	2019 $	2018 $
Deferred Revenue - Sponsorship	3,079,025	2,373,009
	3,079,025	**2,373,009**

Deferred Revenue 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.

Note 6. Financing

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

	Notes	2019 $	2018 $
Cash and cash equivalents	6.1.1	4,445,788	6,766,981
Restricted cash and cash equivalents	6.1.2	8,795,675	6,063,798
Commitments	6.2	7,015,577	4,278,458

6.1 Cash and cash equivalents

6.1.1 Reconciliation of cash

	2019 $	2018 $
Cash and cash equivalents	4,445,788	6,766,981
Restricted cash and cash equivalents - current	8,795,675	6,063,798
	13,241,463	**12,830,779**

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

	2019 $	2018 $
Research grants	8,311,741	5,629,423
Scholarships	483,934	434,375
	8,795,675	**6,063,798**

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

	2019 $	2018 $
Other expenditure commitments		
Within 1 year	3,179,977	2,664,453
Later than 1 year and not later than 5 years	3,505,600	1,614,005
Later than 5 years	330,000	-
	7,015,577	**4,278,458**

The total presented for other expenditure commitments are GST inclusive.

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 instrument

In addition to cash, MRIWA has two categories of financial instrument:

- Financial assets, measured at amortised cost (being receivables and loans and advances); and
- Financial liabilities measured at amortised cost (being payables)

Financial assets measured at amortised cost were categorised as receivables in the prior year and have changed as a result of the mandatory adoption of AASB 9 *Financial Instruments* for the year ended 30 June 2019.

Initial recognition and measurement of financial instruments is at fair value which normally equates to the transaction cost or the face value. Subsequent measurement is at amortised cost using the effective interest method.

The fair value of short-term receivables and payables is the transaction cost or the face value because there is no interest rate applicable and subsequent measurement is not required as the effect of discounting is not material.

(a) Categories of 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 as follows:

	2019 $	2018 $
Financial assets		
Cash and cash equivalents	4,445,788	6,766,981
Restricted cash and cash equivalents	8,795,675	6,063,798
Receivables[(a)]	701,058	449,042
Other current assets	98,167	65,044
Total financial assets	**14,040,688**	**13,344,865**
Financial liabilities		
Finance lease liabilities measured at amortised cost	370,952	398,010
Total financial liability	**370,952**	**398,010**

(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
Initial application of Australian Accounting Standards	8.2
Key Management Personnel	8.3
Related party transactions	8.4
Related bodies	8.5
Affiliated bodies	8.6
Remuneration of Auditors	8.7
Equity	8.8
Supplementary financial information	8.9
Explanatory statement	8.10

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

AASB 9 Financial instruments

AASB 9 *Financial instruments* replaces AASB 139 *Financial instruments: Recognition and Measurements* for annual reporting periods beginning on or after 1 January 2018, bringing together all three aspects of the accounting for financial instruments: classification and measurement; impairment; and hedge accounting.

The Institute applied AASB 9 prospectively, with an initial application date of 1 July 2018. The adoption of AASB 9 has resulted in changes in accounting policies and adjustments to the amounts recognised in the financial statements. In accordance with AASB 9.7.2.15, the Institute has not restated the comparative information which continues to be reported under AASB 139. There have been no differences arising from adoption.

(a) Classification and measurement

Under AASB 9, financial assets are subsequently measured at amortised cost, fair value through other comprehensive income (fair value through OCI) or fair value through profit or loss (fair value through P/L). The classification is based on two criteria: the Institute's business model for managing the assets; and whether the assets' contractual cash flows represent 'solely payments of principal and interest' on the principal amount outstanding.

The assessment of the Institute's business model was made as of the date of initial application, 1 July 2018. The assessment of whether contractual cash flows on financial assets are solely comprised of principal and interest was made based on the facts and circumstances at the time of initial recognition of the assets.

The classification and measurement requirements of AASB 9 did not have a significant impact on the Institute. The following are the changes in the classification of the Institute's financial assets:

- *Trade receivables* and *Loans and advances* (i.e. *Other debtors*) classified as receivables as at 30 June 2018 are held to collect contractual cash flows and give rise to cash flows representing solely payments of principal and interest. These are classified and measured as financial assets at amortised cost beginning 1 July 2018.

- The Institute did not designate any financial assets as at fair value through P/L.

In summary, upon the adoption of AASB 9, the Institute had the following reclassifications as at 1 July 2018:

	AASB 9 Category		
	Amortised cost $	Fair value through OCI $	Fair value through P/L $
AASB 139 Category			
Trade receivables	569,036	-	-
	569,036	-	-

8.3 Key management personnel

The Institute has determined that 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:

	2019	2018
Compensation band ($)		
0 – 10,000	1	3
10,000 – 20,000	5	5
20,000 – 30,000	1	-
150,000 – 160,000	1	-
180,000 – 190,000	1	-
280,000 – 290,000	-	1

	2019 $	2018 $
Total compensation of senior officers	**440,230**[(a)]	**364,721**

(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 2019 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 a research project (included within Revenue from Industry Sponsorship, the value of $94,197)

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:

	2019 $	2018 $
Auditing the accounts, financial statements and key performance indicators	19,184	18,900

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.

	2019 $	2018 $
Accumulated surplus		
Balance at start of period	10,597,391	9,445,270
Result for the period	24,262	1,152,121
Balance at end of period	**10,621,653**	**10,597,391**
Total Equity at end of period	**10,621,653**	**10,597,391**

8.9 Supplementary financial information

(a) Write-offs

	2019 $	2018 $
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 2019, and between the actual results for 2019 and 2018 are shown below. Narratives are provided for key variations selected from observed major variances, which are generally greater than:

- 5% and $92,670 for the Statement of Comprehensive Income and the Statement of Cash Flows
- 5% and $225,337 for the Statement of Financial Position

Statement of Comprehensive Income

	Variance note	Original budget 2019 $	Actual 2019 $	Actual 2018 $	Variance between estimate and actual $	Variance between actual results for 2019 and 2018 $
COST OF SERVICES						
Expenses						
Research grants	1, A	9,066,667	3,898,268	3,396,536	(5,168,399)	501,732
Scholarships	2	350,000	205,424	164,298	(144,576)	41,126
Employee benefits expense		532,600	587,398	542,640	54,798	44,758
Institute Contractor fees	3	234,000	132,312	127,551	(101,688)	4,761
Board and committee fees and costs		145,600	106,627	102,099	(38,973)	4,528
Supplies and services	B	448,700	414,389	224,229	(34,311)	190,160
Other expenses		19,000	96,647	25,274	77,647	71,373
Accommodation expense		47,250	59,250	47,250	12,000	12,000
Depreciation expense		4,000	2,894	3,617	(1,106)	(723)
Total cost of services		**10,847,817**	**5,503,209**	**4,633,494**	**(5,344,608)**	**869,715**

8.10 Explanatory Statement (continued)

Statement of Comprehensive Income (continued)

	Variance note	Original budget 2019 $	Actual 2019 $	Actual 2018 $	Variance between estimate and actual $	Variance between actual results for 2019 and 2018 $
Income						
Revenue						
Interest revenue		220,000	276,093	230,163	56,093	45,930
Other revenue		68,311	33,176	46,009	(35,135)	(12,833)
Revenue from Industry Sponsorship	4, C	4,120,000	2,030,952	1,353,193	(2,089,048)	677,759
Total Revenue		**4,408,311**	**2,340,221**	**1,629,365**	**(2,068,090)**	**710,856**
Total income other than income from State Government		**4,408,311**	**2,340,221**	**1,629,365**	**(2,068,090)**	**710,856**
NET COST OF SERVICES		**(6,439,506)**	**(3,162,988)**	**(3,004,129)**	**3,276,518**	**(158,859)**
Income from State Government						
State Government Grant	5, D	4,089,000	3,128,000	4,109,000	(961,000)	(981,000)
Resources received free of charge		47,250	59,250	47,250	12,000	12,000
Total income from State Government		**4,136,250**	**3,187,250**	**4,156,250**	**(949,000)**	**(969,000)**
SURPLUS/(DEFICIT) FOR THE PERIOD		**(2,303,256)**	**24,262**	**1,152,121**	**2,327,518**	**(1,127,859)**
TOTAL COMPREHENSIVE INCOME FOR THE PERIOD		**(2,303,256)**	**24,262**	**1,152,121**	**2,327,518**	**(1,127,859)**

8.10 Explanatory Statement (continued)

Statement of Comprehensive Income (continued)

Major Estimate and Actual (2019) 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.

2. Scholarships are below estimate as the number of scholarships awarded, and the value of scholarships awarded were less than originally budgeted as a result of the application review process.

3. Hours worked during the year by the Contractor is less than originally budgeted for. Also budgeted for an additional contractor on a part-time basis that did not eventuate.

4. Revenue from industry sponsorship is below estimates as it is difficult to forecast an accurate value of industry sponsorship revenue for 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.

5. The State government grant revenue is below estimate as $1m from Future Battery Industries Cooperative Research Centre is yet to be received.

Major Actual (2019) and Comparative (2018) Variance Narratives

A. Research grants expenditure has increased from prior year as more projects progressed in their research during this financial year, resulting in eligible researcher payments made.

B. Increase in expenses for supplies and services results from increased costs in IT and financial management services and 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.

C. Revenue from industry sponsorship actuals comparison has increased due to more or higher value projects being approved and higher leverage from sponsors.

D. Reduction in grant allocation by State Government in 2018-19 budget.

8.10 Explanatory Statement (continued)

Statement of Financial Position

	Variance note	Original budget 2019 $	Actual 2019 $	Actual 2018 $	Variance between estimate and actual $	Variance between actual results for 2019 and 2018 $
ASSETS						
Current Assets						
Cash and cash equivalents		2,320,055	4,445,788	6,766,981	2,125,733	(2,321,193)
Restricted cash and cash equivalents	1, A	9,280,220	8,795,675	6,063,798	(484,545)	2,731,877
Receivables and other assets		1,100,000	769,918	569,036	(330,082)	200,882
Other current assets		55,000	98,167	65,004	43,167	33,123
Total Current Assets		**12,755,275**	**14,109,548**	**13,464,859**	**1,354,273**	**644,689**
Non-Current Assets						
Office equipment		11,575	11,577	14,471	2	(2,894)
Total Non-Current Assets		**11,575**	**11,577**	**14,471**	**2**	**(2,894)**
TOTAL ASSETS		**12,766,850**	**14,121,125**	**13,479,330**	**1,354,275**	**641,795**

8.10 Explanatory Statement (continued)

Statement of Financial Position (continued)

	Variance note	Original budget 2019 $	Actual 2019 $	Actual 2018 $	Variance between estimate and actual $	Variance between actual results for 2019 and 2018 $
LIABILITIES						
Current Liabilities						
Payables		650,000	370,952	398,010	(279,048)	(27,058)
Provisions		115,000	31,028	105,400	(83,972)	(74,372)
Deferred revenue	2, B	2,500,000	3,079,025	2,373,009	579,025	706,016
Total Current Liabilities		**3,265,000**	**3,481,005**	**2,876,419**	**216,005**	**604,586**
Non-Current Liabilities						
Provisions		-	18,467	5,520	18,467	12,947
Total Non-Current Liabilities		**-**	**18,467**	**5,520**	**18,467**	**12,947**
TOTAL LIABILITIES		**3,265,000**	**3,499,472**	**2,881,939**	**234,472**	**617,533**
NET ASSETS		**9,501,850**	**10,621,653**	**10,597,391**	**1,119,803**	**24,262**
EQUITY						
Accumulated surplus		9,501,850	10,621,653	10,597,391	1,119,803	24,262
TOTAL EQUITY		**9,501,850**	**10,621,653**	**10,597,391**	**1,119,803**	**24,262**

8.10 Explanatory Statement (continued)

Statement of Financial Position (continued)

Major Estimate and Actual (2019) Variance Narratives

1. Below estimate due to timing of execution of the Conditions of Grant for each project and the progress of the research for each project in the Institute's portfolio.

2. Deferred revenue 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 (2019) and Comparative (2018) Variance Narratives

A. Restricted cash has increased from the prior year due to an increased number of projects of higher value being approved by Board throughout the year resulting in the requirement to withhold higher value of funds to meet research project commitments.

B. Deferred revenue has increased from prior years as projects that had Conditions of Grant not yet finalised at the end of 2017-18 had negotiations concluded and research commence in this financial year. The revenue 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 2019 $	Actual 2019 $	Actual 2018 $	Variance between estimate and actual $	Variance between actual results for 2019 and 2018 $
CASH FLOWS FROM STATE GOVERNMENT						
State Government Grant						
Net cash provided by State Government		4,089,000	3,128,000	4,109,000	(961,000)	(981,000)
		4,089,000	**3,128,000**	**4,109,000**	**(961,000)**	**(981,000)**
Utilised as follows:						
CASH FLOWS FROM OPERATING ACTIVITIES						
Payments						
Research Grant Payments		(8,116,667)	(4,196,232)	(3,794,470)	3,920,435	(401,762)
Employee benefits		(522,358)	(592,976)	(520,645)	(70,618)	(72,331)
Institute Contractor fees		(229,500)	(132,312)	(127,551)	97,188	(4,761)
Board and Advisory committee fees		(45,000)	(26,142)	(34,990)	18,858	8,848
Supplies and Services	1	(467,700)	(585,305)	(237,369)	(117,605)	(347,936)
GST payments on purchases	2	(881,387)	(355,455)	(267,068)	525,932	(88,387)

8.10 Explanatory Statement (continued)

Statement of Cash Flows (continued)

	Variance note	Original budget 2019 $	Actual 2019 $	Actual 2018 $	Variance between estimate and actual $	Variance between actual results for 2019 and 2018 $
Receipts						
Receipts from Sponsors	A	3,870,000	2,488,456	2,305,020	(1,381,544)	183,436
Interest received		222,500	279,565	220,484	57,065	59,081
GST receipts on sales	3	387,000	155,515	134,885	(231,485)	20,630
GST receipts from taxation authority	4, B	494,387	247,570	97,049	(246,817)	150,521
Net cash used in operating activities		**(5,288,725)**	**(2,717,316)**	**(2,224,655)**	**2,571,409**	**(492,661)**
Net increase/(decrease) in cash and cash equivalents		(1,199,725)	410,684	1,884,345	1,610,409	(1,473,661)
Cash and cash equivalents at the beginning of the period		12,800,000	12,830,779	10,946,434	30,779	1,884,345
CASH AND CASH EQUIVALENTS AT THE END OF THE PERIOD		**11,600,275**	**13,241,463**	**12,830,779**	**1,641,188**	**410,684**

8.10 Explanatory Statement (continued)

Statement of Cash Flows (continued)

Major Estimate and Actual (2019) Variance Narratives

1. Higher than budgeted actual expenses were due to an increase in expenses for supplies and services from increased costs in IT and financial management services, CEO recruitment activity and provisions for bad debt expenses.

2. The GST payments on purchases is below estimate as there is a direct relationship to the reduced payments to researchers.

3. The GST receipts on sales is below estimate as there is a direct relationship between the difficulty in accurately forecasting sponsorship revenue anticipated for projects and GST receipt on sales.

4. The GST receipts received is below estimate as there is a direct relationship to GST receipts on sales and GST payments on purchases.

Major Actual (2019) and Comparative (2018) Variance Narratives

A. 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 indicate that more research projects have progressed according to their project timeline.

B. GST receipts from the Australian Taxation Authority has a direct relationship to GST receipts on sales and GST payments on purchases. GST receipts has increased from the prior year as a result of higher payments.

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

The Audit and Risk Committee continued to focus on its core role of overseeing the financial and performance reporting and risk management systems and controls for the organisation with specific areas of focus for 2018-19 including:

- Initial “fresh eyes” review of our current processes and controls by the incoming CEO, Nicole Roocke with the aim of identifying areas for improvement and evolution for the organisation.

- Further enhancement to our governance framework and risk management controls including establishing as part of our strategic plan a separate pillar on governance. This has the overarching goal to continue to evolve robust governance and contemporary fit-for-purpose corporate practices.

- Overseeing the assessment of the appropriate accounting treatment and adjusted processes required to ensure compliance with several revised accounting standards that are now applicable, or are becoming applicable in the coming years. In particular in relation to AASB 15 and AASB 1058 relating to Revenue, AASB 9 regarding Financial Instruments and AASB 16 relating to Leases. The committee also ensured continued appropriate reporting on related-party transactions are in line with government requirements.

- Review and re-assessment of our IT security requirements and final approval of a fit-for-purpose IT security implementation plan and infrastructure upgrade.

- Tender process and evaluation of Deloitte 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.

  I would like to acknowledge and thank outgoing providers KPMG (in particular this year to Naustdal Moore) for their excellent contribution in helping establish and support the financial function to MRIWA over many years.

- Further consideration of the options for the Institute’s Effectiveness and Efficiency KPI targets in the future aligned to our new strategic plan and to ensure ongoing relevance and the highest level of transparency and accountability to government and other stakeholders.

- Scoped and commenced a Business Process review with emphasis on records management.

- Further updating the Institute’s policies to ensure contemporary consideration of all required policies as part of the yearly process commenced in 2016.

I would like to again acknowledge the work of my Committee members Larry Lopez and Mark Bush and thank them for their continued valuable contribution.

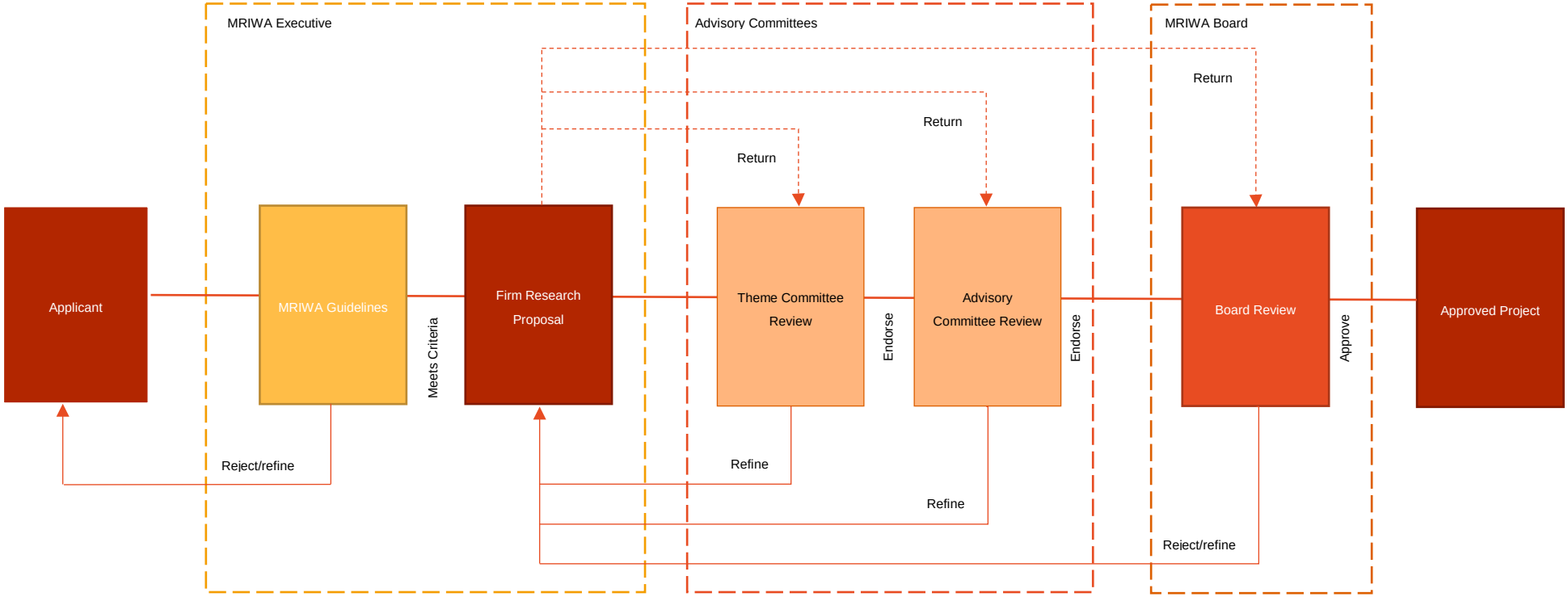
I also wish to acknowledge the work of the former CEO Mark Woffenden, our new CEO Nicole Roocke and Anil Subramanya and Stephanie Ahlfeld from MRIWA.

Helen Cook
Chair
Audit and Risk Committee

Committee Structure and Decision-Making Framework

MRIWA is committed to providing robust, transparent decision making in relation to investment decision into research projects, summarised below.

Research applications are developed by an Applicant with input from MRIWA, before being reviewed by the relevant Theme Committee(s) and then the Advisory Committee with a recommendation made to the MRIWA Board on each project. It is the role of the MRIWA Board to approve investment decisions in specific projects.



Disclosures

Shared Responsibilities with Other Agencies

The Institute did not share any responsibilities with any other agencies in 2018-19.

Ministerial Directives

There have been no Ministerial directives to MRIWA in 2018-19.

Other Financial Disclosures

Capital Works

MRIWA has no capital works projects.

Employment and Industrial Relations

As of 30 June 2019, MRIWA employed 3 people, equating to 2.8 full-time equivalents (FTE).

During the year 1 person ceased employment with MRIWA.

MRIWA employment profile

Employment Type	2017-18	2018-19
Fixed Term Full-Time	2	2
Fixed Term Part-Time	1	1

As required by Commissioner's Instruction No. 23: Conversion and Appointment of Fixed Term Contract and Casual Employees to Permanency a review of eligible positions was undertaken.

Staff Development

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

The requirement for completion of online training modules on information technology security was introduced for all Board members and staff in 2018-19.

Diversity Profile

Diversity Group	2017-18	2018-19
Women on the Board	57%	57%
Women in SES	0	100%
Indigenous Australians	0	0
Employees from Culturally-Diverse Background	33%	33%
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 2018-19 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. Despite each cardholder being reminded of their obligations, one employee inadvertently utilised the corporate credit card for personal use. The matter was not referred for disciplinary action as the Chief Financial Officer noted prompt advice and settlement of the personal use amount, and the nature of the expenditure was immaterial and characteristic of an honest mistake.

Total Amount Expended and Period Outstanding	2018-19
Aggregate amount of personal use expenditure for the reporting period	$1.32
Aggregate amount of personal use expenditures settled within 5 working day	-
Aggregate amount of personal use expenditures settled after 5 working days	$1.32
Aggregate amount of personal use expenditures outstanding at balance date	-

Governance Disclosures

Advertising

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

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 Board, the Advisory Committee and Theme Advisory Committees.

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 Board membership can be located in the ***Overview*** section of the Annual Report.

Membership of the Advisory Committee and Theme 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 is outlined below:

Advisory Committee Membership

The Advisory Committee met six (6) times in 2018-19.

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

Find More Resources Theme Committee

The Find More Resources Theme Committee met three (3) times in 2018-19.

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

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 twice in 2018-19.

Name	Position	Appointment Approved	Period of Membership
Gerard Danckert[(a)]	Chair	1 Feb 2018	31 Jan 2020
John DeVries[(a)]	Member	1 Feb 2018	31 Jan 2020
Rick Stroud	Member	1 Feb 2018	7 Mar 2019
Rathy Brandes de Roos[(a)]	Member	15 Aug 2018	31 Jan 2020

Increase Recoverable Value Theme Committee

The Increase Recoverable Value Theme Committee met five (5) times in 2018 19.

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

Improve Productivity Theme Committee

The Improve Productivity Theme Committee met twice in 2018-19.

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

New Products and Markets Theme Committee

The New Products and Markets Theme Committee met once in 2018-19.

Name	Position	Appointment Approved	Period of Membership
Alison Morley	Chair	1 Feb 2018	31 Jan 2020
Peter Oliver[(a)]	Member	1 Feb 2018	31 Jan 2020
Kathleen Wright[(a)]	Member	1 Feb 2018	31 Jan 2020
Ben Hammond[(a)]	Member	1 Feb 2018	27 Feb 2019

Scholarships Panel

The Scholarships Panel met twice in 2018-19.

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

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* enables the public to apply for access to documents held by MRIWA. No freedom of information request was received by the organisation in 2018-19.

Public Sector Standards and Ethical Codes

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

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

MRIWA uses 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 2018-19 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.* In accordance with this Act, our Chief Executive Officer is our designated Public Interest Disclosure Officer.

In 2018-19 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*.

Bi-monthly reporting of MRIWA's gift and benefits register to the Board was introduced in 2018-19 to ensure no inappropriate acceptance of gifts or benefits and to monitor any notable trends.

Record Management Plan

MRIWA has a Record Management Plan which is due to be reviewed by December 2019 in accordance with section 28 of the *State Records Act 2000*.

Other Legal Requirements

Annual Estimates

Statement of Comprehensive Income

For the year ended 30 June 2019

	Estimate 2020 $
COST OF SERVICES	
Expenses	
Research grants	8,800,766
Scholarships	320,174
Loss on disposal of assets	
Employee benefits expense	780,775
Institute Contractor fees	50,000
Board and committee fees and costs	117,202
Supplies and services	410,586
Other expenses	19,380
Accommodation expenses	47,250
Depreciation expense	3,870
Total cost of services	**10,550,013**
Income	
Revenue	
Interest revenue	200,000
Other revenue	41,462
Revenue from Industry Sponsorship	5,359,680
Total revenue	**5,601,142**
Total income other than income from State Government	**5,601,142**
NET COST OF SERVICES	**4,948,871**

	Estimate 2020 $
Income from State Government	
State Government Grant	4,147,000
Resources received free of charge	47,250
Total income from State Government	**4,194,250**
Surplus/(Deficit) for the period	**(754,621)**
TOTAL COMPREHENSIVE INCOME FOR THE PERIOD	**(754,621)**

Statement for Financial Position

As at 30 June 2019

	Estimate 2020 $
ASSETS	
Current Assets	
Cash and cash equivalents	2,478,373
Restricted cash and cash equivalents	9,913,490
Receivables and other assets	579,766
Other Current Assets	50,000
Total Current Assets	**13,021,629**
Non-Current Assets	
Property, plant and equipment	13,580
Total Non-Current assets	**13,580**
TOTAL ASSETS	**13,035,209**

	Estimate 2020 $
LIABILITIES	
Current Liabilities	
Payables	1,101,074
Provisions	69,304
Deferred revenue	2,900,000
Total Current Liabilities	**4,070,377**
Non-Current Liabilities	
Provisions NCL	-
Total Non-Current Liabilities	**-**
TOTAL LIABILITIES	**4,070,377**
NET ASSETS	**8,964,832**
EQUITY	
Accumulated surplus	8,964,832
TOTAL EQUITY	**8,964,832**

Statement of Cash Flows

For the year ended 30 June 2019

	Estimate 2020 $
Cash flows from State Government	
Cash receipts from Government	4,147,000
Cash flows from operating activities	
Payments	
Research Grant Payments	(8,541,184)
Employee benefits	(780,775)
Institute Contractor Fees	(50,000)
Board and Advisory Committee Fees	(65,572)
Supplies and Services	(429,966)
GST Paid on Purchases	(902,115)
Other payments	
Receipts from Sponsors	4,779,914
Interest received	206,000
GST received on sales	477,991
Net GST refunded from ATO (or paid)	424,124
Cash generated from operations	**(4,881,583)**
Cash flows from investing activities	
Purchase of non-current assets	-
Net cash from investing activities	**-**

	Estimate 2020 $
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	(734,583)
Cash and cash equivalents 1 July 2018/1 July 2019	13,126,446
CASH AND CASH EQUIVALENTS AT END OF YEAR	**12,391,863**

Our Performance

MRIWA commissioned ACIL Allen to undertake the Five Year Review of the MRIWA Act and an Economic Impact Assessment in 2018-19. The key finding of these two pieces of work are summarised below.

This section also contains the audited key performance indicators.

MRIWA Five Year Review

As required under the *Minerals Research Institute of Western Australia Act 2013* (the Act), a review is required to be carried out as soon as practicable after the fifth anniversary of the commencement of the Act.

The review found MRIWA has been effective in meeting its overall objectives as established in its Act and Research Priority Plan, notwithstanding it has yet to meet its formal effectiveness KPI regarding funding leverage.

From an efficiency perspective, MRIWA's administrative costs have not increased beyond its original levels, averaging around $1 million per annum or around 19 per cent of total expenditure between 2013-14 and 2017-18. The Institute has met its efficiency indicator in the last two years of operation as research funding commitments increased.

The MRIWA has an established governance and project selection process to ensure the funding provided to selected research projects is consistent with MRIWA's and the WA Government's strategic goals to support minerals research for the benefit of the State.

The full report can be located on the MRIWA website.

MRIWA Economic Impact Assessment

The direct benefits arising from 20 selected MRIWA projects will generate $142.2 million in benefits over the ten years from 2018-19 to 2027-28 in real (2017-18) dollars. Using ACIL Allen's CGE model, *Tasman Global,* MRIWA's Minerals Research investment is forecast to deliver*:*

Using the ACIL Allen Benefit Cost Assessment framework, it is estimated MRIWA is forecast to deliver a net social benefit of $37 million between 2018-19 and 2027-28, due to the research programs analysed in the study forecast to deliver $54.5 million in benefits versus the cost to the State of the MRIWA's operations of $17.4 million, resulting in a Benefit Cost Ratio of the MRIWA operations since its inception of 3.12.

The full report can be located on the MRIWA website.

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*.

Changes to outcome-based management framework

MRIWA's Outcome Based Management Framework did not change during 2018-19.

Audited Key Performance Indicators

Certification of Key Performance Indicators

For the year ended 30 June 2019

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 2019.

Denise Goldsworthy
Chairperson of the Board

Date: 13 August 2019

Helen Cook
Deputy Chairperson of the Board

Date: 13 August 2019

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	2016-17 Actual	2017-18 Actual	*2018-19 Target*	2018-19 Actual
Ratio of total cash investments in research projects to total approved MRIWA cash investment in those research projects [(a), (b)]	2.55	1.52[(c)]	*3*	3.82[(d)]

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 Batteries Industries (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. It is anticipated the Participant Agreement will be signed Q4 2019 and Project Agreements Q1 2020 onward. 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.

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	2016-17 Actual	2017-18 Actual	*2018-19 Target*	2018-19 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.	4.4%	3.3%	*4%*	4.2%[(a)]

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.

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Visit the MRIWA website for digital versions of this report.

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