

# 04: We minimise our impact



**At MMG we are committed to minimising our environmental footprint through the efficient use of natural resources, management of waste produced and effective life-cycle management.** We are focused on managing our impacts and align our environmental and biodiversity activities with our life-of-asset plans.

## Water access and use

### Our water management approach

Water is used during our mining and extraction processes and by our site-based people.

In supporting the ICMM Position Statement on Water Stewardship, we contribute to initiatives promoting better water use, effective catchment management and improved security and sanitation for surrounding communities.

We are committed to strong and transparent water governance at our operations and collaborate with our communities to achieve responsible and sustainable water use with water management strategies tailored to each site.

Our water balance models use site-specific water inputs, storage and discharge to inform our management of water-related risks. We are in the process of aligning our life-of-asset plans with structured investment decisions regarding infrastructure, processing demands and community requirements.

MMG reports water inputs, outputs and diversions in line with the Minerals Council of Australia (MCA) Water Accounting Framework.



**In supporting the ICMM Position Statement on Water Stewardship, we contribute to initiatives promoting better water use, effective catchment management and improved security and sanitation for surrounding communities**

We reduce potential socio-environmental impacts and safely implement mine dewatering plans. Operational improvements and extreme weather events led to 2022 changes in our water balance. Across MMG's operating sites the following Initiatives were applied in 2022:

- Las Bambas authorised use of water runoff from the Chalhahuacho River. Water recycling and re-use within the mine eliminates negative impacts with any discharge meeting relevant Peruvian environmental standards.
- Rosebery's fresh water comes from the Pieman and Stitt Rivers through a calibrated water balance model overseeing use and consumption. Risk management systems and site controls minimise stakeholder impacts within the catchment. Discharge occurs at a licensed discharge point downstream of the tailings dam. No exceedances were recorded in 2022. Discharge standards are developed with local authorities, respecting the biophysical conditions of the local receiving environments.
- Dugald River's water management structures are appropriately designed to oversee the high intensity flow events of the wet season through defined catchment zones and dams while during the dry season an emphasis is placed on balancing water conservation and optimising reuse.
- Kinsevere's dewatering program is managing increasing water volumes with water either used onsite or released after appropriate quality testing. Additional drilling of boreholes in 2022 is reinforcing capacity and bringing the site additional clean water.

### Water balance and management of water risks

We proactively manage water quantity and quality to reduce potential socio-environmental impacts and realise opportunities whilst implementing our mine dewatering plans that allow us to safely operate.

In line with our ICMM commitments regarding water, we ensure all employees have access to clean drinking water, gender-appropriate sanitation facilities and hygiene across all operations.

# We minimise our impact

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Freshwater (cat 1) inputs by site 2022 (%)

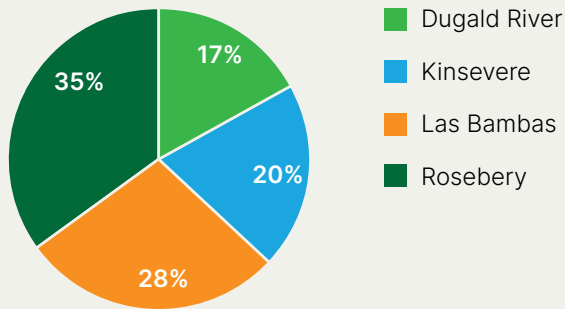


Table 10: 2022 water balance

	ML	(%)
<b>Diverted water</b>	<b>11,931</b>	
<b>Water inputs</b>	<b>37,679</b>	
Borefields	2,523	4
Precipitation and runoff	20,618	37
Rivers and creeks	7,270	13
Aquifer interception	205	0
External surface water storages	3,407	6
Entrained in ore that is processed	1,801	3
Contract/municipal	1,856	3
Third party wastewater	0	0
<b>Water consumption</b>	<b>18,797</b>	<b>33</b>

Table 11: 2022 Freshwater inputs by site %

	ML	(%)
<b>Diverted water</b>	<b>21,176</b>	
<b>Water outputs</b>	<b>33,736</b>	
Evaporation	7,682	23
Entrainment	12,538	37
Discharge to surface water	10,252	30
Seepage	1,234	4
Supply to third party	141	0
Other	1,890	6



## CASE STUDY

### Renewable energy secures community fresh water supply

MMG Kinsevere's *Cahier des Charges* program is maintaining and increasing community access to fresh water with the provision of village solar-powered water pumps with 1.5 HP capacity connected to a 10 m<sup>3</sup> water tank and a six-tap standpipe. The introduction of renewable energy is crucial for the villages as local people can effectively manage a sanitary and continuous water supply. Kinsevere's ongoing program of work will also bring future enhancements. In 2022 MMG Kinsevere's team, led by the Deputy General Manager Project Delivery and the Social Department Manager, visited two local villages near the Nambulwa Exploration site, where this critical infrastructure has been installed, for a water pump hand-over ceremony.





## CASE STUDY

### Dugald River climate change preparedness – sediment dam upgrade

A predicted increase in extreme and intense rainfall events and weather patterns has mobilised the Dugald River environment team to upgrade a sediment dam as a mitigation strategy. The Sediment Dam F upgrade supports a higher throughput of stormwater runoff and improved release of water quality. The team also redirected additional runoff from non-acid forming waste rock to the dam, which houses an automated dosing station. The dam upgrade work increased capacity by about 200% to 7.7ML. Water quality was also improved with the inclusion of a flocculant dosing system (water treatment for mineral extraction) coupled with other adjustments to adapt to rainfall intensity and maintain water release quality.



We contribute to initiatives **promoting better water use, effective catchment management and improved security and sanitation** for surrounding communities

# We minimise our impact

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## Tailings and waste rock

Mining and processing metals such as copper, zinc and cobalt generate tailings known as mineral waste. Tailings are safely stored in tailings storage facilities (TSF) compliant with strict international standards and guidelines, such as the Australian National Commission on Large Dams (ANCOLD) and the GISTM.

In 2022, MMG generated in total 1.1 million tonnes of potentially acid forming (PAF) waste rock, 122.77 million tonnes of non-acid forming (NAF) waste rock and 47 million tonnes of tailings generated rock, presenting a reduction of 8.78% of mineral waste generated across MMG compared with the previous year. The complete tables with MMG's 2022 mineral waste data can be found in the Appendix at [www.mmg.com](http://www.mmg.com).

In Las Bambas, no PAF waste rock was generated in 2022. Rosebery's only PAF waste rock was generated and kept underground in old stoping areas to avoid environmental impact and to improve stability. Additionally, in Dugald River we use approximately half of tailings to create paste backfill that is re-injected into underground voids.

In 2022, at our Las Bambas operation, the Independent Tailings Review Board (ITRB) annual review was completed onsite with the lifting of COVID-19 restrictions. The ITRB committee confirmed the TSF is designed and operated consistent with applicable standards and industry practice. We are continuing with our evaluation of future tailings management options to minimise impacts from ongoing tailings management, including post-closure.

During 2021, our Rosebery site continued studies to develop additional tailings capacity using existing facilities, as well as investigating a new facility consistent with ANCOLD guidelines and the requirements of the GISTM. An emergency dam break drill took place at Rosebery in 2022 involving MMG, relevant authorities, Tasmanian Emergency Services and the community members.

Rosebery synchronously operates two tailings storage facilities. Current approved projects provide tailings storage until 2024.

Kinsevere and Dugald River tailings operations continued as usual with capital improvements including raising an existing TSF and commencing construction on a new TSF to safely manage future tailings production.

At Dugald River, a new Progressive Rehabilitation and Closure Plan was finalised and submitted to the regulator, including a revision of the TSF consequence category based on up-to-date studies. At Las Bambas, geochemical characterisation studies and onsite rehabilitation trials reacting to waste rock and tailings are ongoing. Kinsevere has also initiated some revegetation trials, and continued the progressive reprocessing of historic TSF1 tailings, reducing closure liability.

Closure prefeasibility studies continued in 2022 for the Hercules legacy and Rosebery operational mine sites in Tasmania, which, when complete, will allow an evaluation of all credible closure scenarios to select the best option(s), in consultation with the community and other external stakeholders. A large-scale (~10ha) TSF closure cover and trial plot area installed in 2021 continued to be regularly monitored at Rosebery. Data obtained to date from the trial is providing valuable information for the cover system design for all TSFs, and will support the final closure designs.

These studies will bring MMG more definitive information to support closure planning and cost estimation, as well as informing community and government stakeholder discussions. The current financial provision for closure of all MMG operations (including TSFs) is reported in our Annual Report, which can be found here and has been externally audited.



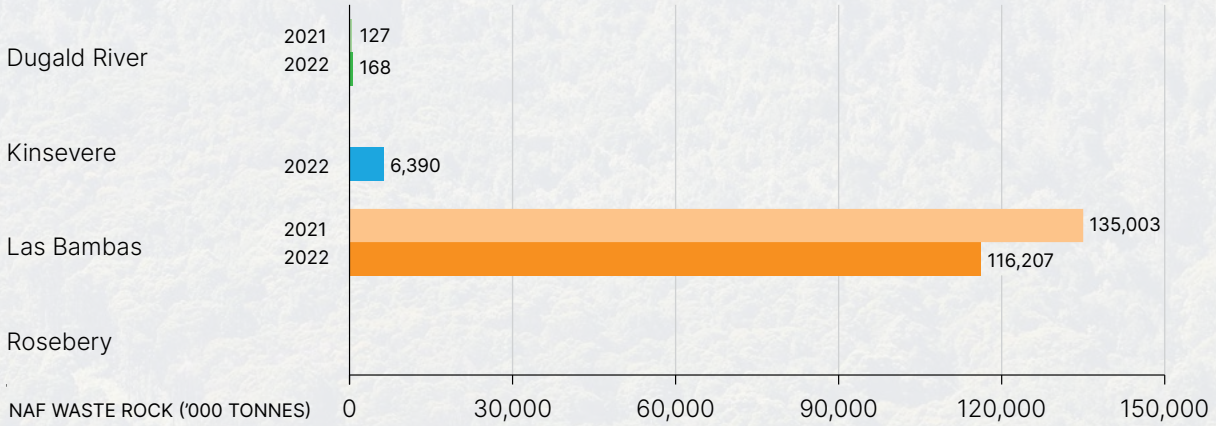
Read more detail in the Annual Report at:

[mmg.com](http://mmg.com)

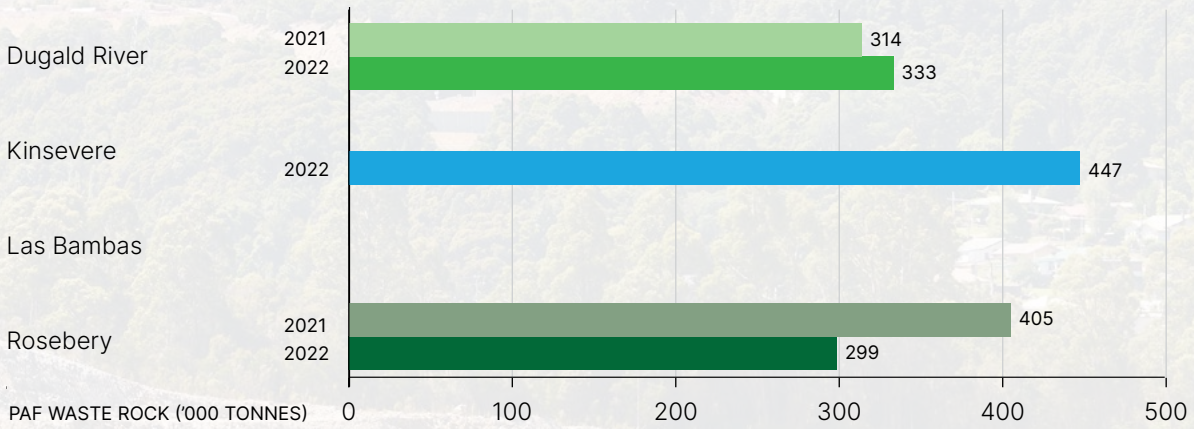


## Waste rock generated in 2022

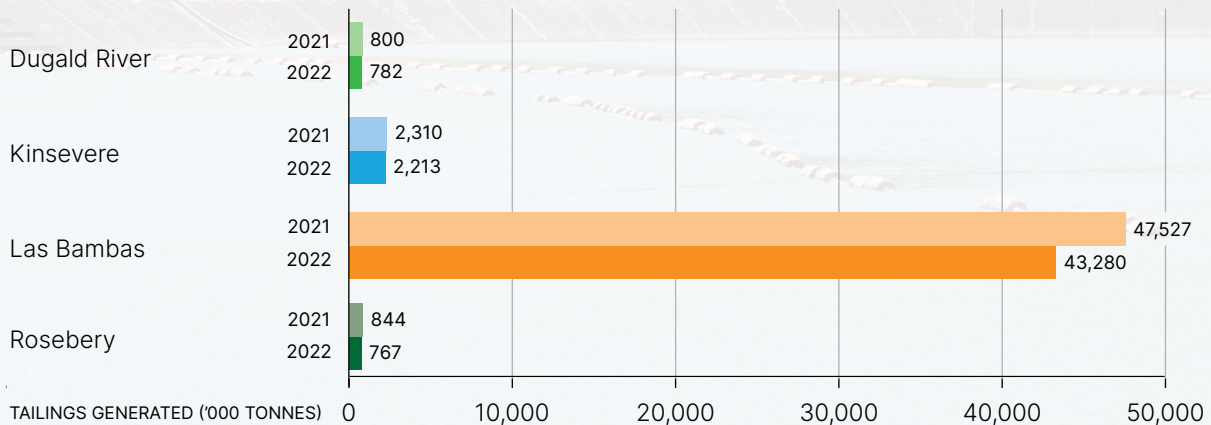
### NAF waste rock mined



### PAF waste rock mined



### Tailings generated



● Dugald River ● Kinsevere ● Las Bambas ● Rosebery

# We minimise our impact

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## CASE STUDY

### Rosebery mine life extension

Rosebery continues to work in consultation with the Tasmanian Government and our local community to determine how best to construct additional tailings capacity that meets all regulatory, environmental and community expectations. The site requires expanded tailings storage to continue operations beyond 2025. Since 2022 MMG Rosebery has been looking for additional storage and, from that time, has undertaken a successful raise and is now progressing with a further raise. Rosebery has conducted studies for over a decade to develop solutions that best balance biodiversity values with geotechnical and environmental considerations of the local area. The 2022 year was challenging for Rosebery. With the existing tailings storage facility (TSF) close to capacity, safe future options, in addition to the preferred South Marionoak location, continued to be investigated. Stage one of Rosebery's Life Extension Program has been completed and alternative TSF sites have been identified that are both within the existing footprint of the operation and external to Rosebery. Key to this is approving an accelerated exploration program to grow and improve confidence in Rosebery's future mining inventory. The Rosebery team is reviewing filtered tailings as an alternative disposal method and potential expansion of existing storage sites. In support of the second stage of Rosebery's work program, MMG has bolstered its leadership capability by appointing a Senior Manager of Development. Noting the critical role MMG has in driving Tasmanian state economic activity and employing over 500 people, our number one priority is to secure a strong future for the operation.





Table 12: 2022 MMG TSF summary

TSF	Type (ground, valley, mountain or other)	Dam raising type	ANCOLD dam failure consequence rating	Total designed height	Total designed capacity	TSF service life		Most recent expert review date
						Came into service	End of service	
Las Bambas TSF1	Valley	Downstream	Extreme	220m	780Mm <sup>3</sup>	2016	2032	Oct.22
Dugald River TSF1	Valley	Downstream for future raises - currently a single stage construction	High C	37m	11.1Mt	2018	2029	Feb-23
Kinsevere TSF1	Side valley	Upstream	High C	~10	1.1Mm <sup>3</sup>	2006	2010	Sep-22
Kinsevere TSF2	Paddock	Downstream	Extreme	43m	30Mt	2011	2025	Sep-22
Rosebery 2/5 Dam	Side valley	Upstream/ downstream	High A	29m	3.3Mm <sup>3</sup>	2018	2025	Jun-22
Rosebery Bobadil	Side valley	Upstream/ downstream	High C	37m	12.6Mm <sup>3</sup>	1974	2025	Jun-22

Mm<sup>3</sup> = Millions of cubic metres.

Mt = Million metric tonnes.

Note:

- The ANCOLD dam failure consequence rating is based on the potential impacts of a failure in a TSF. Refer to definition on page 77 for the consequence table.
- For more information about our TSFs, visit [www.mmg.com](http://www.mmg.com).



# Climate change

In 2022, global attention was again focused on the urgency of climate change following several years of pandemic-induced lockdowns. The 27th United Nations Climate Change Conference of the Parties (COP27) was held in Cairo, Egypt, urging participants to increase the ambition in their current climate commitments. The International Council on Mining and Metals (ICMM) attended this event, representing member companies such as MMG. Global emissions are not reducing as fast as they should be in order to secure a well below 1.5 degree Celsius warming in 2100, increasing the urgency of industry-wide involvement and commitment to reduce operational emissions.

Due to the observed increase in frequency and intensity of extreme global weather events, MMG is improving our understanding of local and worldwide climate-related risks and building business resilience to respond to a changing climate. We are pursuing decarbonisation efforts by optimising energy use and migrating to renewable energy sources. We welcome the progress made by governments to cooperatively reach the Paris Agreement and support long-term global climate goals, balancing greenhouse gas reductions with economic and social development.

In addition to our goal of net zero carbon emissions by 2050, we have set an interim 2030 target of reducing Scope 1 and Scope 2 operational greenhouse gas emissions from our operated assets by 40%, from a 2020 baseline. This interim target aligns with science-based methodologies to help reduce global warming to 1.5°C, as per ambitions of the Paris Agreement. We will also drive reductions in our value chain emissions (Scope 3) through initial measurement and disclosure by the end of 2023, followed by target setting and working with our supply chain partners on emission-reduction opportunities.



In addition to MMG's goal of net zero carbon emissions by 2050, we have set an **interim 2030 target of reducing Scope 1 and Scope 2 operational greenhouse gas emissions** from our operated assets **by 40%**, from a 2020 baseline.

Demand for critical minerals and other base metals necessary for the decarbonisation of the economy has increased and is expected to continue growing in coming years. MMG plays a key role in providing these metals to our customers to drive the development of green technology that will replace fossil fuels.

The minerals that we produce are essential to our transition plans as we move in step with global efforts to achieve a lower carbon economy. The need to take tangible steps is becoming more urgent for governments, organisations and the wider public in the face of extreme weather events and the challenges this brings for food and water security. In addition to our investment projects that are assisting to build local capability where we live and work, we're working with the governments and communities where we live and work to achieve these goals.

During 2022, Las Bambas saw a decrease in overall operational emissions mainly due to the social conflicts that kept production below targets. As Kinsevere advanced with its expansion project, MMG's total emissions grew slightly. Rosebery and Dugald River both remained stable in 2022, with a slight lift in Dugald River's emissions caused by deeper mining and increased diesel consumption through moving materials. The mining industry overall faces diesel dependency challenges. This is a key focal point for MMG's ongoing research and development initiatives. We are focusing on collaborative partnerships to bring our sites solutions for replacing diesel and other fossil fuels with renewable options.

Table 20: Total greenhouse gas (GHG) emissions (tonnes CO<sub>2</sub>-e)

		Direct GHG emissions	Indirect GHG emissions	Total
Dugald River	2022	15,771	91,562	107,333
	2021	15,492	84,351	99,843
Kinsevere	2022	54,454	8,599	63,053
	2021	22,919	2,593	25,512
Las Bambas	2022	416,473	206,580	623,053
	2021	464,699	201,213	665,912
Rosebery	2022	15,258	23,662	38,920
	2021	16,078	22,983	39,061
MMG	2022	501,956	330,403	832,359
	2021	519,188	311,140	830,328

# Climate change

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## MMG's approach to sustainability

Our approach to sustainability is aligned to ICMM's 10 Mining Principles and the United Nations' SDGs.

### MMG's Sustainability Framework

Group-wide Sustainability Metrics have been developed to drive sustainable performance through the business plan and individual incentives



### Towards zero emissions



**Commitment**  
Commitment to a goal of net zero carbon emissions by 2050



**Scope 1 & Scope 2**  
2030 target of reducing greenhouse gas (GHG2) emissions by 40%, from a 2020 baseline



**Scope 3**  
Further identify and drive emissions reductions in our supply chain. Report on this by end of 2023

### Delivering on commitments and partnering with our communities



No poverty



Zero hunger



Quality education



Good health and wellbeing



Gender equality



Clean water and sanitation



## MMG Climate Strategy update

MMG's Climate Strategy is now tied to business planning, with all sites determining potential decarbonisation pathways and credible timelines for implementing greenhouse gas (GHG) reduction opportunities. Carbon emissions data, reporting and projections have been strengthened, and a Scope 3 emissions (indirect greenhouse gases) inventory is to be developed in 2023 together with customers and suppliers. Transitioning to 100% renewable electricity supply is the fastest and most reliable way to cut emissions, as technology is still being developed to displace diesel from mobile equipment fleets. MMG also participates in several industry research consortiums to learn how peers are using technology to drive their decarbonisation progress. MMG is committed to strengthening GHG emission data collection, reporting, risk assessment and future projections. These steps will boost transparency of how MMG tracks and publicly discloses GHG emission targets, reinforcing a key company value: 'We do what we say'. MMG will also stress-test emission projections under several climate change and carbon pricing scenarios to strengthen the climate strategy. To learn more visit: [wemineforprogress.com](http://wemineforprogress.com).

## CASE STUDY

### Dugald River Solar Farm



In its push to transition to a lower carbon economy and realise cost savings, MMG has become a foundation customer for power sourced from an 88MW solar farm, built and operated by APA Group at Mica Creek in Mount Isa, Queensland. Dugald River, which has a 15-year contract with APA, is a foundation partner sourcing 33MW of renewable electricity. Currently, 87% of Dugald River's carbon emissions are generated from its primary reliance on the Mount Isa-based Diamantina gas-fired power station. The 33MW of power will be supplied by the solar farm, with most of Dugald River's energy needs sourced during daylight hours. The solar farm is expected to bring cost savings and reduce Dugald River's energy-related CO<sub>2</sub> emissions by 33%. These benefits are critical for a remote mine that requires multiple power sources to reduce the rising costs incurred with limited power supply options. MMG is exploring further options to reduce Dugald River's emissions.



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## Biodiversity and land management

MMG implements considered strategies and actions when identifying and managing any potential biodiversity impacts. We actively manage our land holdings over the life of our operations by implementing low or 'no disturbance' areas that may form future conservation reserves, controlling invasive species, restoring degraded ecosystems and translocating endangered plants and supporting the breeding requirements of vulnerable animals.

We avoid disturbing the local environment setting wherever possible. When planning mining-related closures, we strive to re-establish vegetation cover and find opportunities to develop self-sustaining ecosystems that support the social, cultural, environmental and economic objectives of our host communities and the surrounding landscape.

As an ICMM member MMG complies with its Mining and Protected Areas Position Statement.

The lease of our Dugald River operation is home to the *Petrogale purpureicollis* (Purple-necked rock-wallaby) protected species. Through our bi-annual monitoring to collect data on the species and its habitat, MMG has recorded a case of successful rehabilitation with no change to this species' population in 2022. Ongoing monitoring is key to future biodiversity and rehabilitation activities.

MMG Dugald River's work with the University of Sunshine Coast (USC) and Queensland University of Technology (QUT) is researching the Carpentarian Pseudantechinus (*Pseudantechinus mimulus*), a small carnivorous native mouse-like marsupial. Over the past five years the project has gathered information on the distribution, habitat preferences, ecology and taxonomy of the Carpentarian Pseudantechinus, with MMG contributing over US\$300,000 to the cause.



## 2022 Cumulative land disturbance and rehabilitation at our operations (ha)

		Total land disturbed and not yet rehabilitated	Total land rehabilitated
Dugald River	2021	372	1
	2022	372	1
Kinsevere	2021	535	0
	2022	785	1
Las Bambas	2021	2,403	102
	2022	2,422	104
Rosebery	2021	318	0
	2022	319	0



## CASE STUDY

### Dugald River working with landholders

Weed invasions threaten native plants and animals as they compete for nutrients to survive. To combat their growth and spread, Dugald River's environment team has collaborated with the local site's landholder on an annual weed control program targeting the invasive weeds called Calotrope and Rubbervine. Additional resources outside of the mining lease help with vehicle and plant equipment inspections prior to site access by stemming the spread of noxious seeds. Dugald River's Land and Biosecurity Management Plan and Weed Control Program are informed by the local municipality's Biosecurity Plan.



Dugald River also commissioned a team of ecologists to conduct a flora study focused on refining the current broad scale regional ecosystem mapping, bringing the site more detailed maps and a better understanding of the unique and sensitive regional ecosystems in which it operates. This study will help determine future rehabilitation success criteria and rehabilitation plans.

The conservation of biodiversity is embedded in Las Bambas, with environmental management plans and rescue and relocation protocols for amphibians and rodent species. Las Bambas has proudly pioneered this initiative in Peru. In 2021, the Forestry and Wild Fauna Service (SERFOR) granted Las Bambas approval to relocate the following species:

- Dark field mouse (*Akodon subfuscus*)
- Painted big-eared mouse (*Auliscomys pictus*)
- Aquatic frog (*Telmatobius jelskii*)
- Warty toad (*Rhinella spinulosa*)
- Marsupial frog (*Gastrotheca marsupiata*)
- Marbled frog (*Pleurodema marmoratum*)

All relocation activities were executed in compliance with SERFOR's Wild Fauna Management Regulation, and IUCN's criteria for translocations for conservation purposes.

#### Closure and rehabilitation studies continued in 2022

In 2022, MMG again applied a consistent approach to closure and progressive rehabilitation planning across our four global operations, with ore body locations and mining methods influencing available outcomes. As underground mines have limited opportunities for rehabilitation prior to end of life, MMG has not set annual progressive rehabilitation targets. Instead, we annually build allowances into our closure plans where there is scope to progressively rehabilitate areas no longer required for operational purposes, as well as undertaking trials and closure studies.

MMG actively contributes to the ICMM Mine Closure Working Group and leverages the participation of peer companies to continually benchmark our own internal processes and improve our mine closure performance.

In 2022, MMG continued our major industry sponsorship of the Cooperative Research Centre for Transformations in Mining Economies (CRC TiME), a 10-year, US\$130 million research initiative between

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the Australian Government, industry and academia, focused on delivering resilient post-mining futures. This year the final research report was published from a CRC TiME project completed at Rosebery on understanding local readiness for closure, via initiation of an ongoing multi-stakeholder participatory approach. A second CRC TiME project at Rosebery continued on improved prediction, remediation and closure of acid and neutral metalliferous drainage (AMD/NMD) sites, in collaboration with several other industry peers.

At Dugald River, a new Progressive Rehabilitation and Closure Plan was finalised and submitted to the regulator. At Las Bambas, geochemical characterisation studies and onsite rehabilitation trials reacting to waste rock and tailings were initiated. Kinsevere has also initiated some revegetation trials, and continued the progressive reprocessing of historic TSF1 tailings, reducing closure liability.

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## CASE STUDY

### Kinsevere's commitment to plant over 60,000 trees

With trees known to reduce air pollution and greenhouse gases while bringing many other environmental benefits, MMG Kinsevere was keen to commit to planting over 60,000 trees across its mining lease and nearby villages over the next year. To mark the initiative, Kinsevere representatives joined with the MMG Kinsevere Health, Safety and Environment team and local people in a tree planting ceremony. Over the next year, the plantings will feature citrus, guava, avocado and other fruit trees, becoming a place of reflection and peace – a tangible symbol of MMG Kinsevere's goal of enhancing local community benefits.

