

RESPECTING OUR ENVIRONMENT

ADDITIONAL INFORMATION

Environmental impacts left over after mining **MI**

Long-term planning for the management of residual environmental impacts from mining is a fundamental issue for the industry and stakeholder concern. MMG incorporates mine closure planning as early as possible in project development, with an increasing focus on integrating closure planning within LOA plans. In late 2013 a dedicated Closure Planning Team was created, reporting to the Life Of Asset Group Manager. During 2014 we will review and update the existing Closure Standard. The use of LOA planning to establish annual targets for progressive rehabilitation is a new requirement of the Environment Standard. It provides operating discipline to achieve effective rehabilitation at closure of the asset. For more details on MMG's closure planning and process see material issue, *Managing life of mine/closure and post-closure planning* on page 32.

Our closure planning process continues to evolve with varying levels of conformance at each site against the Closure Standard. Site internal assessments against conformance have been validated. Closure Provisions for each site were also reviewed.

MMG continues to improve consistency and quality of site closure cost estimation and planning, and on incorporation of closure planning into site LOA plans.

The MMG Legacy Risk Advisory Committee meets bi-annually to identify, prioritise, manage and close out legacy risks across our business, assets and entities. Legacy risks in Tasmania were a key focus of the committee in 2013, in particular the decommissioning and rehabilitation of the old Hercules mine site.

Hercules decommissioning and rehabilitation

Stage 1 of the Hercules project was completed in 2013 and included development of a closure concept for the site. The concept was presented to the MMG Legacy Advisory Committee in the first quarter of 2014. During 2014 Stage 2 of the project will involve external stakeholder engagement, seeking endorsement of the closure concept and agreement of closure completion criteria. Once agreed, the concept will be progressed through prefeasibility, feasibility and design.

Century open-pit production cessation

Century announced in 2013 that production in its open-pit would cease in 2015. About A\$7 million of rehabilitation and closure-related works were conducted at Century in 2013. These included the construction of three cover systems as part of a medium-term trial to determine which is most suitable for encapsulation of the Century tailings storage facility (TSF). Inhouse remediation of the bulk sample waste rock dump, which was constructed during early mine development, was also undertaken. This work enabled some of the mine's mobile equipment operators to gain valuable rehabilitation experience. Other environmental works included the ongoing revegetation of available areas through aerial reseeded and remediation of disturbed land. Permanent drainage features were also installed to prevent acid mine drainage on the south-west waste rock dump. For more information on Century's closure planning with stakeholders, see *Managing life of mine/closure and post-closure planning* on page 32.

Land management

Land disturbance and rehabilitation

Progressive rehabilitation of disturbed land is integral to LOA plans and is undertaken as soon as practicable to minimise closure liabilities.

At the beginning of 2013, a total of 6,060 hectares of land was in use and classified as 'disturbed' (see *2013 Total land disturbance and rehabilitation by site* table on page 2 of this additional information online). During 2013 a further 357 hectares were newly disturbed, mainly to access gold deposits at Sepon. In 2013 major rehabilitation commenced at Century, including tailings storage facility capping trials and the bulk sample waste rock dump relocation.



Mine rehabilitation at Sepon.

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TOTAL LAND DISTURBANCE AND REHABILITATION BY SITE (Ha)

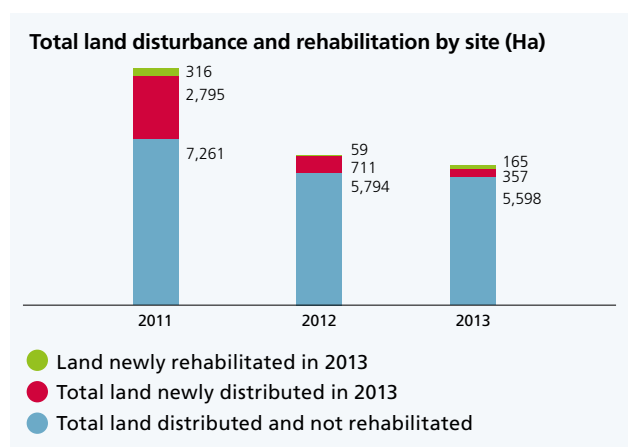
SITE	TOTAL MINE LAND LEASE AREA			TOTAL LAND DISTURBED & NOT REHABILITATED		
	2011	2012	2013	2011	2012	2013
Century	23,500	23,500	23,250	2,533	2,500	2,447
Dugald River	4,221	4,221	3,221	20	87	101
Izok Corridor	–	–	119,720	0	2	0
Exploration	–	2,530,410	3,908,881	31	317	NA
Golden Grove	13,094	13,094	13,094	2,021	949	945
Kinsevere	–	5,345	1,614	–	445	320
Rosebery	4,944	4,944	4,944	221	220	220
Avebury	–	–	800	–	–	0
Sepon	1,250,000	1,250,000	1,250,000	2,435	1,274	1,565
MMG Total	1,295,759	3,831,514	5,325,523	7,261	5,794	5,598

– = Did not report

TOTAL LAND DISTURBANCE AND REHABILITATION BY SITE (Ha) (CONTNUED)

SITE	TOTAL LAND NEWLY DISTURBED IN 2013			TOTAL LAND NEWLY REHABILITATED IN 2013		
	2011	2012	2013	2011	2012	2013
Century	0	0	3	0	33	56
Dugald River	0	67	19	0	0	5
Izok Corridor	0	1	0	0	0	0
Exploration	8	13	8	10	2	61
Golden Grove	1,283	16	11	176	4	15
Kinsevere	–	449	0	–	4	4
Rosebery	220	1	0	0	0	0
Avebury	0	–	0	0	–	0
Sepon	1,284	164	316	131	16	25
MMG Total	2,795	711	357	316	59	165

– = Did not report



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Land access denied/delayed **MI**

There were no major land access issues encountered during 2013. Sepon's community and stakeholder engagement process continues to manage consultation and collaboration with landholders regarding requests for land use. At Dugald River, stakeholder engagement with local Indigenous communities progressed regarding land use agreements for the project.

Biodiversity management **MI**

Mining activity in our operational areas can impact the habitats of native flora and fauna. MMG aims to maximise biodiversity values by applying the mitigation hierarchy¹² throughout the mining life cycle.

The land area held by MMG fluctuates regularly. At the end of 2013, the total land area managed globally was approximately 5,325,523 hectares. Some of this land is adjacent to areas of high biodiversity value and high-use value for local communities. Effective management of this land and our impacts on surrounding ecosystems are critical priorities for us.

Biodiversity management plans are in place at all of our operational sites. During 2014 these will be combined with land management plans to meet the requirements of the new Environment Standard.

Sepon

A strategic review of options to create a biodiversity offset for areas disturbed by gold mining was conducted in 2013. Sepon continued to support the Wildlife Conservation Society (WCS) in 2013 to rear critically endangered Siamese crocodile (*Crocodylus siamensis*) hatchlings at Vientiane Zoo. More juveniles matured in captivity during 2013 to reach the release stage. On 6 March 2013, 19 crocodiles were released back into their wild habitat, the wetland of Ban Than Soum in the Champhone district of the Savannakhet Province, where they continue to be monitored by the WCS. The release was organised by the WCS and witnessed by local villagers and government officials.

MMG also conducted a fauna survey at Sepon on the Thambing Cave, located near to the Phavat gold pit. This survey aimed to identify the significance of the ecosystem and advise us on the community's support needs.

Kinsevere

Kinsevere continued to manage and monitor the relocation of nine flora species from its Kinsevere Hill area. These species are classified under the International Union for Conservation of Nature (IUCN) as vulnerable, endangered or critically endangered. There will be ongoing implementation of the site's biodiversity management plan in 2014.

Dugald River

A Deed of Agreement on biodiversity offsets for Dugald River, finalised in 2012, will be in use throughout the life-of-asset. During 2013 small areas of state-significant biodiversity value

were cleared for development, with management under the biodiversity offset strategy. Dugald River also developed a Purple-necked Rock Wallaby monitoring program. This began in early 2013 and has identified a population that has colonised the north waste rock dump.

Izok Corridor

In 2013 we focused on gathering seasonal baseline data to maintain long-term data sets. The project is considering a request from the Government of Nunavut to support Global Positioning System collaring of the Dolphin and Union Caribou herd in 2014, to monitor their migrations. Our support for this program allows access to data, builds a cooperative working relationship with government and demonstrates our commitment to what is a key regional environmental issue.

Other species management

Century monitors on-site populations of the Purple-necked Rock Wallaby (*Petrogale purpureicollis*), listed as vulnerable under the Queensland *Nature Conservation Act 1992*. Golden Grove has the Malleefowl (*Leipoa ocellata*), listed as vulnerable according to IUCN red list, found within leases. Golden Grove also manages small populations of Stylidium species, a Trigger grass classified as Declared Rare Flora under the Western Australia *Wildlife Conservation Act 1950*. In Tasmania at a trial area on the South Hercules site, there are translocated grooved Cheeseberry plants (*Planocarpa sulcata*), declared 'rare' under the Tasmanian *Threatened Species Act 1995*.

Air quality, emissions and dust

We recognise the importance of identifying and understanding potential impacts associated with air quality, emissions and dust management. We have plans in place to manage site-related impacts.

We monitor a range of air emissions specific to site impacts, licence requirements and for Australian sites' National Pollutant Inventory (NPI) requirements. These include particulates, nitrous oxides (NOx), sulphur oxides (SOx) and volatile organic compounds (VOCs). This is the first year that we are reporting for Kinsevere.

Dust at mine sites is managed by regular monitoring, road maintenance and targeted road watering. Process controls are also used, such as sprays, covers on conveyors and dust-collectors.

A significant difference in NOx and particulate emissions data is noted for Century primarily due to an improved level of emissions reporting rather than actual changes to the discharge profile.

For more information on MMG's workplace air quality monitoring and outcomes, including the specific monitoring and management of diesel particulate matter, please refer to page 26 of the Health and Safety chapter.

11 The mitigation hierarchy is (in order of priority): avoid, minimise, rehabilitate, then offset.

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EMISSIONS TO AIR BY SITE (Tonnes)

SITE	NO _x		SO _x		VOCS		PARTICULATES	
	2012	2013	2012	2013	2012	2013	2012	2013
Century	448	144	9	18	21	19	2,679	4,190
Dugald River	–	10	–	0	0	4	0	18
Golden Grove	148	278	0	0	15	23	2,609	1,919
Kinsevere	–	46,896	–	34	–	3,368	–	2,867
Rosebery	92	81	0	0	6	6	218	328
Sepon	133	149	13	134	–	–	–	–
MMG Total	821	47,558	22	186	42	3,420	5,506	9,322

Did not report in 2011

– = Did not report

Mineral waste management

Mining and processing generate mineral wastes (such as tailings and waste rock) and non-mineral wastes (such as oils and general refuse) that require management. Understanding the characteristics of these waste streams and managing them assist in reducing the potential long-term environmental impacts and cost liabilities that can result.

Mineral waste facilities contribute towards MMG's current disturbance area with certain facilities remaining as long-term landforms post-closure. Some facilities, such as tailings storage, are chemically reactive, resulting in acid and metalliferous drainage (AMD) and require appropriate management. We focus on characterising, planning and managing waste, effectively starting as early as possible.

Mineral waste management is integrated into LOA planning to provide for long-term safe storage and disposal of mineral waste and to prevent and reduce AMD impacts. To optimise site operations, non-acid forming (NAF) material and potentially acid forming (PAF) material balance and separation plans are incorporated into LOA plans.

With the exception of Kinsevere, our sites have mineral waste management plans where there are varying levels of mineral waste types. The integration of mineral wastes within a single management plan will be a focus for 2014. Understanding the geochemistry of the Kinsevere waste rock and tailings facilities continued to be a focus during 2013. A leach and kinetic testing program will be undertaken in 2014 to further inform Kinsevere's understanding of the long-term risks, and facilitating identification of appropriate management measures.

MINERAL WASTE MANAGEMENT¹²

SITE	WASTE ROCK MINED (T)			TAILINGS GENERATED (T)		
	2011	2012	2013	2011	2012	2013
Century	34,580,000	41,630,516	37,102,186	4,390,000	2,358,698	6,124,339
Dugald River	–	390,571	1,966,669	–	–	–
Golden Grove	456,000	8,082,032	6,328,146	1,300,000	1,444,052	1,545,754
Kinsevere	–	2,047,585	4,481,079	–	887,801	2,954,244
Rosebery	376,000	666,388	502,533	595,000	643,597	445,204
Sepon	14,899,000	12,187,778	7,920,649	3,651,000	5,270,731	4,147,723
MMG Total	50,311,000	65,004,870	58,301,262	9,936,000	10,604,879	15,217,264

¹² No mineral wastes were recorded for Izok Corridor, Exploration and Avebury.

– = Did not report

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Energy uses, sources and carbon emissions MI

Mining is a comparatively energy-intensive industry, with direct energy use accounting for greater than 10% of the total operating costs for MMG in 2013. Across our operations and offices, the efficient use of energy is important to minimise greenhouse gas (GHG) emissions, as well as improving business efficiency and asset utilisation. Our Energy and Greenhouse Gas Standard is now embedded within the new Environment Standard. It requires systematic identification and implementation of opportunities to improve energy efficiency and reduce GHG emissions.

As part of the Australian Energy Efficiency Opportunities Program for 2012–13, 14 projects were implemented during the financial year. These included six at Rosebery, three at Century and three at Golden Grove, as well as five at Sepon (see the *Emissions reductions with operational efficiency* case study on page 44).

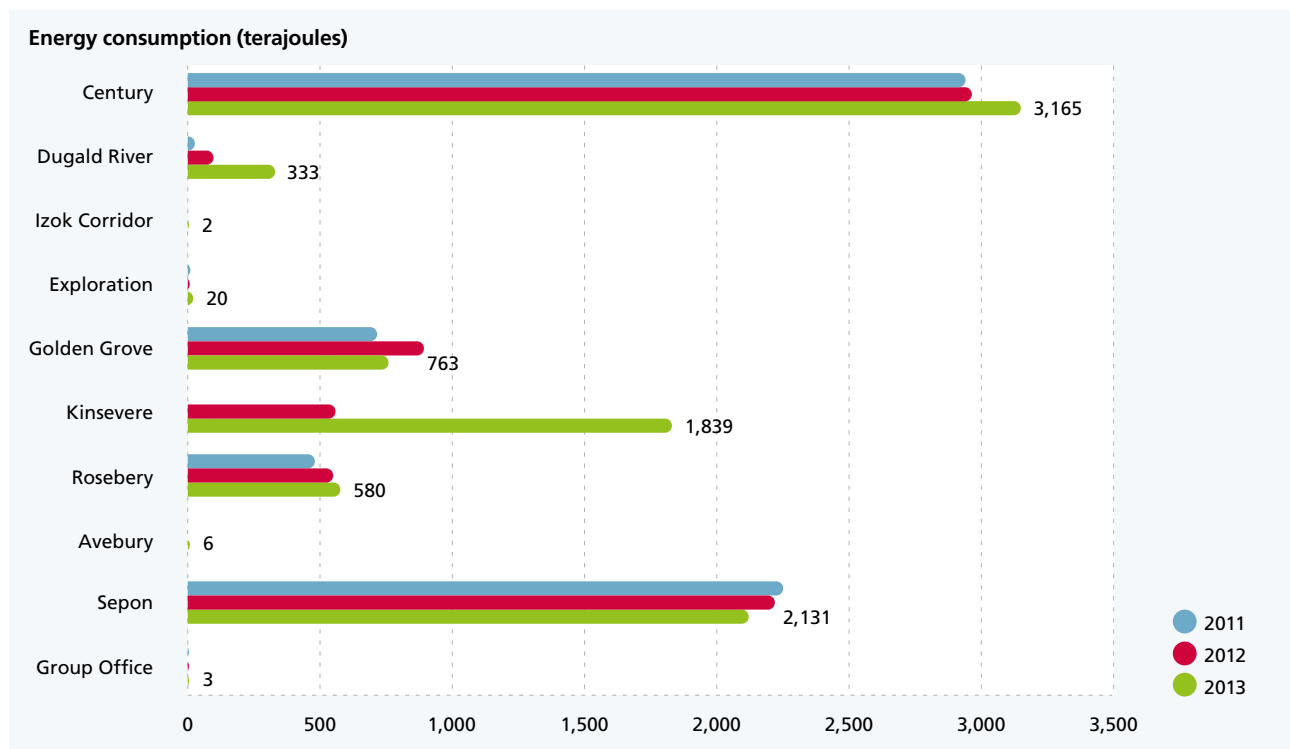
Kinsevere

Emissions intensity reduced across most of our sites in 2013. However, Kinsevere experienced low availability of grid-sourced power which resulted in a reliance on diesel generators, accounting for approximately 56% of its energy use. This accounts for Kinsevere's 170% increase in emissions intensity. Historically the site used a high proportion of imported renewable (hydro) and subsequently had a relatively low emissions profile.

Sepon

Sepon's energy consumption and GHG emissions decreased significantly from 2012 to 2013, reflecting the reduction in demand for diesel and electricity resulting from suspending gold mining and processing operations.

ENERGY CONSUMPTION (TERAJOULES)



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GREENHOUSE GAS EMISSIONS (T CO₂-e) (SCOPES 1 AND 2)¹³

SITE	SCOPE 1			SCOPE 2		
	2011	2012	2013	2011	2012	2013
Century	115,037	117,073	111,948	201,230	204,689	240,890
Dugald River	1,744	6,786	19,149	–	–	4
Izok Corridor	–	–	152	–	–	0
Exploration	613	451	1,404	31	–	0
Golden Grove	18,014	26,520	22,598	100,838	102,937	96,533
Kinsevere	–	28,780	85,489	–	158	213
Rosebery	11,372	13,417	12,877	27,015	27,493	23,387
Avebury	–	–	0	–	–	358
Sepon	62,699	201,232	180,625	226,159	225,610	216,151
Group Office	0	0	0	665	744	909
MMG Total	209,479	394,259	434,491	555,938	561,631	578,447

– = Did not report

¹³ **Scope 1 emissions:** direct GHG emissions from sources owned or controlled by the entity, including emissions from fossil fuels burned on site, from entity-owned or entity-leased vehicles, and other direct sources.

Scope 2 emissions: indirect GHG emissions resulting from the generation of electricity, heating and cooling, or steam generated off site but purchased by the entity, and the transmission and distribution (T&D) losses associated with some purchased utilities (e.g. chilled water, steam, and high-temperature hot water).

Scope 3 emissions: not reported as these are not material to MMG. Scope 3 emissions include indirect GHG emissions from sources not owned or directly controlled by the entity but related to the entity's activities. Scope 3 GHG emission sources currently required for federal GHG reporting include T&D losses associated with purchased electricity, employee travel and commuting, contracted solid waste disposal, and contracted wastewater treatment. Additional sources that are currently optional under federal reporting requirements, but are significant, include GHG emissions from leased space, vendor supply chains, outsourced activities and site remediation activities.



Landscape surrounding the Rosebery mine and township.