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Rehabilitation Management Plan

Greening the Golden Mile

Prepared by: KCGM
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INTRODUCTION

This management plan outlines the rehabilitation objectives and processes for design and construction, rehabilitation and monitoring of our waste rock dumps and other areas across KCGM such as tailings storage facilities and historically disturbed areas.

The Fimiston Waste Rock Dumps are described in the *Consultative Environmental Review Mine and Waste Dumps – Fimiston August 1990.* This project was approved by the Minister for Environment in October 1991. Since that time, there have been modifications to the WRD footprint via the DoIR Notice of Intent process. More recent modifications to the Waste Rock Dumps, in closer proximity to the community, have been approved by the DoIR and the Minister for Environment under Section 45C of the *Environmental Protection Act, 1986*.

The total waste movement for KCGM has been calculated at 908 million tonnes. This material will be relocated into waste rock dumps surrounding the eastern, northern and southern sides of the pit as well as internally within parts of the final pit void. To meet the LOM waste dumping requirements additional waste rock dump areas at the northern end of the KCGM operation require further approval.

Waste rock dump construction and rehabilitation occur concurrently with mining. The final waste dumping configuration will remain somewhat flexible in relation to economic analysis and operating costs over the life of mine. However the maximum waste rock dump footprint will cover a total of about 1630 hectares (Figure 1). The waste rock dump footprint is increased as the overall heights of the dumps are restricted due to the proximity of the KCGM operation to the City of Kalgoorlie-Boulder airport.

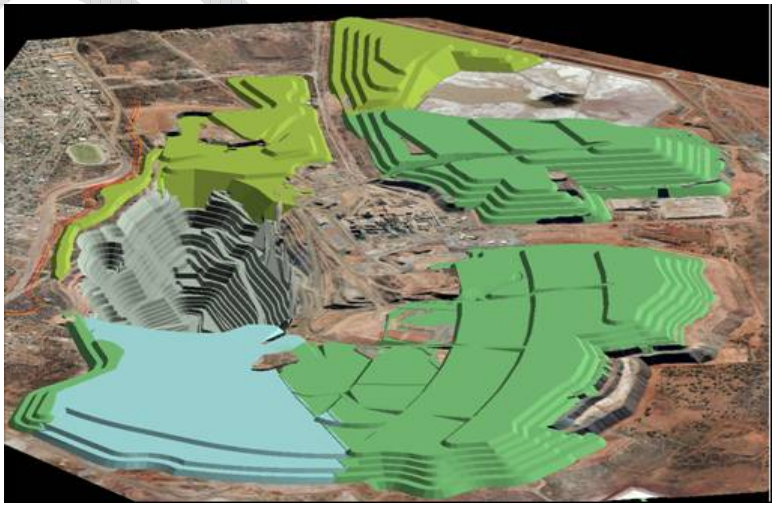


Figure 1 - Proposed Final Waste Dump and Open Pit Landform

KCGM undertakes continual review and optimisation of waste rock dumping plans and trucking routes to keep the dumps at short distances from the open pit mining. By optimising haul routes we envisage making substantial reductions to energy use and thereby lowering our greenhouse gas emissions.

The Fimiston waste rock dumps are a prominent feature of the surrounding landscape and are visible to the City of Kalgoorlie-Boulder. KCGM continues to work on designing the final form of the waste rock dumps to ensure that where possible they are integrated into the landscape.

KCGM operates two tailings storage facilities called Fimiston I TSF (~110ha) and Fimiston II TSF (~350ha) for its Fimiston operations. The TSFs store all of the tailings generated from the crushing, grinding and leaching of about 14 million tonnes of ore per year through the Fimiston Mill. Fimiston II TSF takes about 80% of the tailings with the remainder going to Fimiston I TSF. A much smaller TSF (~10ha) is also located at the Gidji Roaster.

To meet tailings storage requirements for the proposed 2017 mine life, further tailings storage capacity will be required (in addition to the 10-15m proposed height increase of Fimiston I and II TSFs). Two options have been considered and the preferred option is to acquire the Kaltails TSF and raise the perimeter embankment height to use in conjunction with the Fimiston I and Fimiston II TSFs. The contingency option is to continue to raise the perimeter embankment height of the Fimiston I and Fimiston II TSFs.

KCGM rehabilitates disturbed areas; tailings storage facilities and waste rock dumps as soon as possible after the final perimeters are reached. The benefits of progressive rehabilitation include the early establishment of vegetation, which reduces dust levels and improves visual amenity. In addition this also results in a significant reduction in the amount of rehabilitation required when mining is completed.

Natural ecosystems in the region are studied to determine the best range of plants for soils and slopes on the new landforms. This is reflected in the mixes of plant seed for rehabilitation. The rehabilitation done by KCGM aims to establish plant communities that will be stable for the long-term. Monitoring, research and ongoing improvements to revegetation methods are an important part of this process.

OBJECTIVES

The key objective of rehabilitation at KCGM is to ensure that decommissioned sites are left in a safe and stable condition, after taking into account beneficial uses of the site and the surrounding land. This is further reinforced by the close proximity of the KCGM operations to the City of Kalgoorlie-Boulder.

An independent review of rehabilitation techniques and success has been undertaken. This review considered the success of all trials and rehabilitation undertaken on site to date to ensure that the rehabilitation methodologies used at KCGM (and outlined in this document) are best practice for the operation.

To date rehabilitation techniques and trials have included:

- Varying fertiliser treatments and rates.
- Moon scaping techniques.
- Mycorrhizal fungi trials.
- Addition of gypsum.
- Varying seeding rates.
- Mulching.
- Hydro-seeding.
- Seeding scarification techniques.

Some of these trial techniques have been more successful than others and may continue to be utilised or further trials undertaken. The DoIR recently provided positive feedback on the techniques used at the Fimiston II Tailings Storage Facility (TSF), where larger rocks were intermixed with the growth medium to create a niche for seed germination and the minimise erosion (Figure 2).

Figure 2 - Fimiston II TSF Rehabilitation

This methodology has shown good performance to date and this rehabilitation technique will be used on current areas that have not yet been topsoiled or seeded.

However it is recognised that rehabilitation is a continuous improvement process and this may need modification based on ongoing monitoring of performance. KCGM is committed to monitoring the performance of our rehabilitation and where required undertaking remedial works.

DESIGN AND CONSTRUCTION

Waste Rock Dumps

KCGM waste rock dumps are constructed using waste rock mined from the Fimiston Open Pit. The nature of the material ranges from oxide to transitional and primary rock and changes with depth and location.

The DoIR *Guideline for Mining in Arid Environments* is considered in the KCGM operating procedures for waste rock dump construction. Whilst these provide general principles, specific methods discussed in these guidelines are not necessarily applicable to all sites in all cases. Waste rock dumps are created and shaped to final designs by adhering to specifications to reduce erosion that may affect long-term stability and integrity of the dumps.

Waste rock dumps are generally built in 20m high lifts with a wide berm between the lifts and are designed to be geo-technically stable incorporating a minimum factor of safety (FOS) of 1.3 static and 1.0 pseudo static conditions. During design and construction, provision is always made for the final step of rehabilitation.

Slopes are battered and normally angled between 14 and 20º. The battered surface is covered with about 200-250mm of soil materials in order to provide a growth medium for revegetation. Further information regarding trials of varying topsoil depth is included in Appendix A.

Where possible the growth medium is intermixed with large rocks to provide stability for vegetative growth and to minimise any erosion that may occur from heavy rainfall. This is achieved through deep ripping to 1m. A dual or triple tyne is used to avoid soil compaction by dozer tracks.

Deep ripping with winged tynes has been shown to be effective in breaking up soil compaction and forming deeper contour furrows in which seed, water and leaf litter can accumulate. These measures have resulted in greater infiltration of rainfall and reduced the potential for large-scale erosion. Most biomass observed in a review of the Fimiston Waste Dump trials was found established in rip lines.

In some areas if ripping to 1m is unable to be achieved, the depth of the growth medium will also be reduced. This will ensure that there is still adequate mixing of the rocks and growth medium resulting in more stable rip lines. Shallow ripping in deeper oxides tends to result in subsidence of the rip lines over time and a subsequent lack of water control.

The control of erosion and water run off is an important factor in rehabilitation. The design of the waste dumps is to capture water rather than release and water management strategies are incorporated into the design. These design structures not only provide effective water management but harvest and hold water which will subsequently benefit vegetation growth.

The water management strategies include (but are not limited to):

- Ripping to a nominal depth of 1 m. Winged tynes will create deep rip lines along the contour to enhance soil mounding and permeability. Contour ripping also helps to control runoff and maintain moisture.
- Rock armouring of embankments. Deep ripping will also intermix the growth medium with rocks to provide stability for vegetative growth and minimise any erosion and run off that may occur from heavy rainfall.
- A berm will be installed where possible to “break” the slope when the bund is more than 15 m vertical in height. These will be back sloping to control run off and promote infiltration.
- Installation of bunds on flat areas and on berms (perpendicular to the contour to compartmentalise the berm) to promote water storage and infiltration (if required).

Tailings Storage Facilities

The normal construction technique for tailings storage facilities (TSFs) at KCGM involves a starter embankment constructed from overburden, and subsequent lifts developed in the upstream method using dried and compacted tailings. These embankments and lifts are constructed with a final slope of 20° or less. In the case of old TSFs these will be modified to a slope of 20° or less (where practicable) if this was not part of the original design.

KCGM is committed to fully encapsulate the Fimiston tailings storage facilities with waste rock after completion of tailings deposition. The tailings are sheeted with a 1 m layer of waste rock. The waste rock normally consists of a high percentage of larger size rock fractions, in order to minimise the potential for capillary rise of salt from the underlying tailings. Growth medium is then spread across the waste rock sheeting to a depth of approximately 20 cm and then deep ripped or scarified on the contour.

In 2001 the Mt Percy TSF was sheeted with a 1m layer of oxide (as waste rock was unavailable at the site) and then deep ripped on the contour. The site was hydromulched using a truck-mounted cannon/boom to spray a mixture of shredded newspaper, fresh water and native seed over the rehabilitation areas. Mushroom compost was also added to the seed, water, paper mixture to increase the level of organic matter in the seed bed.

The Gidji TSF will either be rehabilitated in-situ or the tailings reprocessed (removing the TSF) and the site rehabilitated. The viability of reprocessing the tailings is currently under investigation.

The prevention of erosion on the sides of the TSF is critical to maintaining overall structural integrity of the TSF. Berms and rock drains have been used for TSF surface water management.

A combination of fresh rock and topsoil has been used to sheet KCGM's TSFs since 1997, resulting in a more stable embankment and most likely provides a suitable water 'store-release' cover. A store-release cover is a soil cover that allows all rainfall to be stored in the soil and released under evapotranspiration in dry conditions.

Historically Disturbed Areas

Historically disturbed sites are first cleaned-up and made safe (e.g. old shafts backfilled and fenced) and then landscaped in a manner compatible with its surroundings and to avoid long term erosion. Topsoil and/or salvaged vegetation may be required to be transferred to these sites once earthworks are complete. The area is then usually ripped on the contour with a dozer. Ripping assists in reducing soil compaction, soil aeration, increasing water infiltration and reducing water runoff and erosion.

MATERIAL CHARACTERISATION

The geological and physiological properties of the waste rock are well understood. The Fimiston Open Pit is predominantly hosted by Golden Mile Dolerite (GMD) with a small percentage to the west hosted by Williamstown Dolerite (WD) and the Black Flag Beds (BFB) sedimentary sequence.

Any exposed mineralisation within the dolerite will contain sulphide minerals in conjunction with carbonates, the presence of both these minerals results in a neutralising effect with no proven acid generation potential.

Of the total volume of waste material removed from the Fimiston Open Pit and placed in waste rock dumps, approximately 3% is shale; the remainder is 80% dolerite and 17% basalt. However, potential acid generating material is limited to less than 1% of the total waste rock still to be removed from mining the Fimiston Open Pit.

KCGM undertakes total sulphur analysis on all material to be mined, whether ore or waste and potentially acid generating material is identified. The Black Flag Beds contain bands of pyritic shale which have an acid generation potential.

This Shale material is placed within the waste rock dump where it can be buffered from above and below by dolerite and basalt waste which has a neutralising effect on any acid that may be generated. KCGM has a policy of not dumping Black Flag Beds waste rock within 50m of the final face of a waste rock dump avoiding potential surface exposure.

An acid drainage risk evaluation study undertaken concluded that the risk of acid drainage formation in the Fimiston waste rock dumps is in general low, although a slightly higher risk of localised acid drainage resulting from past management of waste rock, in particular the Black Flag Bed waste rock.

Even though the risk of acid generation is considered low, KCGM has established some long-term kinetic tests to monitor the quantity of water draining through bulk samples of waste rock blends.

Further work is planned to gather more definitive information on the potential for acid generation to occur at KCGM and may identify if additional procedures are required to respond to potential issues before they occur. This involves undertaking static and kinetic test work on waste rock lithologies. Upon evaluation of this, the need for additional test work will be determined which may include quantifying the risk of acid rock drainage and determining the management approaches.

TOPSOIL MANAGEMENT

The management and replacement of growth medium onto rehabilitation areas is important for successful revegetation. While the integrity of growth medium is best retained through immediate respreading this is not always possible given construction and progressive rehabilitation schedules.

KCGM stockpiles growth medium to cover the surface of primary rock waste dumps and tailings storage facilities and assist in the revegetation of the outer embankments. Due to this historical nature of the site this material is primarily oxide although some topsoil has been reclaimed from available areas.

KCGM is currently investigating the potential for differential growth medium use in rehabilitation. This basically means that where practicable the higher quality growth medium will be used in the areas that are highly visible to the City of Kalgoorlie-Boulder.

Suitable growth medium is recovered and stockpiled in front of advancing waste rock dumps or other cleared areas and reapplied to rehabilitation areas directly or in close proximity to minimise rehandling or storage impacts on microflora. Available growth medium is reclaimed where practicable in accordance with the following practices:

- Growth medium will be removed from areas to an approximate depth of 300 millimetres (depth may vary, all suitable growth material will be removed);
- Potable water will be utilised for dust suppression during growth medium removal to prevent potential salt contamination.
- Growth medium stockpiles will be limited to 2 meters high and located in close proximity to minimise rehandling or storage impacts on microflora.

- Removed revegetation may be mulched and placed over the stockpile to assist with stabilisation, control erosion and reduce potential dust emissions.
- If the stockpile will be stored for the longer term then germination of seed may be used to maintain soil microbe levels, replenish the seed store, reduce erosion and discourage weeds.
- Material removed from stockpiles for future rehabilitation should be taken from the top of the stockpiles rather than from just the sides (where practicable).

Growth medium is generally spread over rehabilitation areas at a rate of about 200-250mm. It has been recognised that historically some waste rock dump faces at KCGM have been layered with too great a thickness of growth medium (500mm or greater).

Some sites have been corrected through the scalping of the growth medium. Other sites are being monitored via LFA and observation and remedial works are occurring where appropriate to correct water flows. Scarping, re-sheeting with aggregate or deeper ripping methods are also being considered. These methods must be weighed against disturbing the existing vegetation and if the change is potential harmful to slope stability, soil loss or visual amenity. In the interim these sites will be monitored over time and if rehabilitation success is limited then KCGM is committed to undertaking further remedial works.

KCGM has conducted a range of either campaign or ad-hoc soil testing. We recognise ongoing and systematic testing is required to monitor and manage soil properties. Results from this ongoing test work will be incorporated into the future development of rehabilitation programs and this Rehabilitation Management Plan.

REVEGETATION

Species Selection

The landforms are revegetated with seeds that are typical to the Eucalypt chenopod open woodland around the Kalgoorlie region. Species typically used in KCGM rehabilitation are shown in the following table.

Acacia acuminata	*Eucalyptus lesouefii*
Acacia hemiteles	*Eucalyptus salicola*
Atriplex amnicola	*Eucalyptus salubris*
Asrida contorta	*Eucalyptus stricklandii*
Atriplex bunburyana	*Eucalyptus torquata*
Atriplex codonocarpa	*Maireana brevifolia*
Atriplex holocarpa	*Maireana georgei*
Atriplex lindleyi	*Maireana pentatropis*
Atriplex nummularia	*Maireana pyramidata*
Atriplex semibaccata	*Maireana tomentosa*
Atriplex semilunaris	*Maireana trichoptera*
Atriplex stipitata	*Maireana triptera*
Atriplex vesicaria	*Melaleuca sheathiana*
Austrostipa nitida	*Ptilotus exaltatus*
Casuarina obesa	*Scleroleana diacantha*
Dodonea lobulata	*Senna artemisioides ssp artemisisides*
Dodonea viscosa	*Senna artemisioides ssp filifolia*
Eucalyptus campaspe	*Zygophyllum eremaeum*
Eucalyptus clelandii	

All seeds used in the seed mixes at KCGM are local provenance species of the goldfields region. Seed mixes are based on the species which occur in the established rehabilitation obtained from the vegetation monitoring using the Landscape Function Analysis results and soil testing. Only the species that have been proven as successful have been used in the seed mixes.

All seed that is collected for use in rehabilitation is tested for viability by specialist contractors. Seeds are cleaned and free of debris and as appropriate may be treated by exposure to smoked water or mechanical scarification for hard coated seeds to encourage germination.

Three seed mixes have been designed for areas where topsoil or oxide have been used as a growth medium and one specifically for the tailings storage facilities, where species have been included which are resilient to more saline conditions and may have root depth limitations. Seed mixes may be adapted and improved upon according to soil characteristics and availability of seed.

Soil Characteristics

Seed mixes are adapted and improved upon according to soil characteristics and availability of seed. Where salinity is identified as a problem at a particular site, this may be left for a period of time to leach the salts by rainfall prior to seeding. In trials where seeding on the Fimiston I TSF was delayed for 12 months, plant density and species diversity were greater and weed density less than on a similar site that was immediately seeded.

A preliminary leaching trial of four oxides was established in 2005. From this trial it was recommended that attempts should be made to identify soils that have naturally low salinities and do not require further treatment, and to leach only those soils with salinity levels above the tolerance level for plant germination and growth. The depth of the material is an important factor as there is the potential for significant salt accumulation at the base of the waste dumps if thick layers of oxide are applied.

The application of native seed at KCGM has been traditionally been onto high quality growth medium (i.e. topsoil); this material has been effective in rehabilitation however this resource is very limited. Growth medium at KCGM is primarily lower quality oxide that is sourced from the open pit. This growth medium is saline and the pH can be extremely variable. However with adequate site preparation a range of salt resistant and salt tolerant vegetation can be established on oxide material.

KCGM has had varying success with the application of gypsum to growth medium for plant growth. Soil sampling continues and analysis of these helps determine if trace element deficiency or physio-chemical properties are conducive to plant growth. In turn sampling can also determine if ameliorants may be worth applying.

Mulching and fertiliser application has also been trialled with limited success. Further information regarding mulching and fertiliser trials is included in Appendix A. Elsewhere hydro mulching has been used at KCGM with mixed results. Time appears to be important in allowing some rainfall to leach and ameliorate soils over several seasons to allow for future plant growth.

Seeding Methodology

Hand seeding is presently the main method for seed broadcasting at KCGM. Hydro mulching and mechanical seeding by dozer have also been used at KCGM with varying success in some areas and still warrant consideration.
Hand seeding in rehabilitation has been used throughout the mining industry for many years. Carried out correctly this method is superior to any other seed distribution technique and coupled with suitable soil, topographic and climatic conditions will result in excellent seed germination and subsequent plant growth.

The principles behind successful hand seeding are:

- Having a seed mix homogeneous despite variation in seed size and weight.
- Providing uniformity of the seed mix spread across areas to be rehabilitated.

Seedlings and tube trees are also used in some rehabilitation areas. In recent years seedling preparation and planting methods have changed to planting tube trees with no reticulation and monitoring indicates a survival rate of about 65%. However, reticulation may still be used in key areas (such as the environmental noise bund).

It has been noted from visual assessment and vegetation monitoring that some species colonise earlier than others and that this process may take a few years to occur. Based on this KCGM has recently review monitoring data and will commence a process of applying successive seed mixes to achieve the most effective revegetation outcome. It is proposed that the successive seeding regime would be as follows:

- **Pioneer Seed Mix**
  The initial seeding process is ideally conducted within the first 12 months of an area being rehabilitated (battered, top soiled and ripped), to minimise potential erosion. The first application of seed should be as soon as practical to obtain the optimum germination success and consist of species that are regarded as early colonisers. These include species from the *Chenopodiaceae* family (Saltbush and Bluebush) and *Poaceae* (Grasses) which are prolific seeders that bind and stabilise the soil, therefore assisting with minimising any potential for erosion.

- **Secondary Seed Mix**
  The second seeding should occur from 6 to 12 months after the early colonisers have established (based on Landscape Function Analysis results). Timing for this second seeding should commence during summer thunderstorm events or increasing temperatures, which is the optimum time for the germination of the very opportunistic *Eucalypt* and *Acacia* species.

Seeding rates have been designed to reflect the surrounding natural bush with regards to species composition. Consideration is also given to the type of growth medium and germination rates. The topsoiled areas will have a total seeding rate of 12kg/ha (pioneer 7kg/ha, secondary 5kg/ha), oxide areas 18kg/ha (pioneer 11kg/ha, secondary 7kg/ha) and tailings storage facilities 16kg/ha (pioneer 10kg/ha, secondary 6kg/ha).

MONITORING

KCGM has used the Land Function Analysis (LFA) to monitor the progress of rehabilitation. This method incorporates links between vegetation structure and soil function. A slow consistent growth in the last 3 years has been observed and indications that oxide (subsoil) is stable but has a low nutrient infiltration rate.

LFA relies upon comparisons with analogue sites which have similar shaped landforms. Analogue sites are within a 50km radius of KCGM. Traditional botanical methods of monitoring rehabilitated areas are applied at the same time as LFA such as Point Centred Quarter. This method reveals results such as species richness, diversity, and percentage canopy cover. Conceptual completion criteria have been identified as part of the Conceptual Mine Closure Strategy for LFA monitoring.

Rehabilitation monitoring of waste rock dumps has shown that growth does occur on lower quality growth medium (i.e. oxide) however at a much slower rate when compared to those covered with higher quality growth medium (i.e. topsoil). Other rehabilitation areas covered with subsoil material have progressively shown positive signs of rehabilitation after several years and this growth continues with consistent rainfall.

Whilst it is known from waste dump trials conducted in the mid-1990's that the higher quality growth medium (i.e. topsoil) has a greater plant density cover and diversity. This is likely to be due to the lower salinity levels and the additional seed source from the growth medium particularly if it was fresh. However over half the species on the topsoil treatments were weeds whereas none of the species growing in the oxidised growth medium were weeds. It is recognised that many of the old topsoil stockpiles had high weed infestations.

An active weed control program is used on site. Sightings of weeds are recorded and weeds are removed by hand or chemical spraying where declared weeds are prominent.

The design performance of the rehabilitated areas including waste rock dumps and tailings storage facilities are routinely inspected especially following periods of heavy precipitation to identify any areas of ponding, water runoff or erosion. The water diversion and sediment control structures are also inspected to verify they are operating according to design.

If areas are identified as potentially at risk from water erosion, remedial work is carried out as soon as practical. Remedial work can include inclination of the berms, redesigning and backfilling areas where erosion and gullies have occurred and if required re-contouring of the area with re-ripping and re-seeding.

MINE CLOSURE PLANNING

In December 2004, KCGM presented the Fimiston Operations Extension Project for the final development of the Fimiston Open Pit with the public release of KCGM's Concept Plan - Sharing Our Vision for the Future. The Concept Plan marked the first time that KCGM had announced a closure date for the open pit operations, and presented graphical images of the final Fimiston Operation in 2017. KCGM sought and received feedback from the community on the content of the Concept Plan.

The Conceptual Mine Closure Strategy formalises KCGM's commitment and approach towards closure of all aspects of its operations. KCGM aims to continue the discussion on mine closure to identify regulatory and community expectations and ideas for operation closure in 2017. The Strategy will remain a fluid document that will be reviewed and updated every three years to ensure changes in areas such as the regulatory environment, community expectations or technical closure planning information are captured and incorporated into decision making processes.

The Strategy covers all operations on tenements under the control of KCGM and it provides the basis from which detailed Closure Plans for specific areas will be developed. Regulatory authorities and the community will be involved in developing agreed commitments and targets for closure. Further information regarding the Strategy can be found in Appendix B.

Although the current expected mine life of the Fimiston Open Pit is to 2017, planning is underway to consider opportunities to extend the mine life. It is already public knowledge that KCGM is looking at the underground mining potential from the open pit, while the toll treating of ore has also been proposed to prolong mine life.

The key to KCGM's closure planning is flexibility and the further development of stakeholder awareness as the operations draw closer to an actual resource depletion end date. It is intended that a more definitive timeline of environmental, social and financial studies will be created when the Fimiston Operations are within 5 years of closure.

BONDS

Projects such as KCGM, that result in significant disturbance to the surface of the land that requires restoration and rehabilitation will require submission of an unconditional performance bond to the Department of Industry and Resources (DoIR) prior to approval being given.

Bonds are set at a level which is intended to encourage the rehabilitation of mining disturbance on the tenement in question to a satisfactory standard. They are generally based on a set of predetermined criteria/rates that relate to the estimated cost of remediation and rehabilitation, and do not necessarily reflect the actual cost of rehabilitation.

The bonds cover all land required to be rehabilitated and include waste dumps, tailings storage facilities, stockpile areas, backfilled pits, hardstand areas, plant sites, haul roads and the safety zone around any abandoned open pit. Open pit floors and walls will not normally be included as land required to be rehabilitated.

Most tenements held by KCGM have bonds set which are related to the disturbance area and type and the bond itself is a condition placed on the individual tenement. The historical nature of the KCGM operation has resulted in a large number of tenements across the site which may intersect many different activities or in some cases many different tenements may be located under a waste rock dump or tailings storage facility.

Each year as part of the Annual Environmental Report, KCGM reviews and updates the Tenement Summary Sheets. The Tenement Summary Sheets outline the disturbance and rehabilitation for previous years, for the AER year and that proposed for the next 12 months.

The bonds placed on KCGM are reviewed annually as part of the Annual Environmental Report and may be increased or decreased dependent on the total areas disturbed and areas successfully rehabilitated. This process is designed to encourage progressive rehabilitation. The large number of tenements across the KCGM operations makes the bond review process quite complex and KCGM is working with the DoIR to determine if a more streamlined process can be developed.

The Department of Industry and Resources (DoIR) are currently undertaking a review of the environmental performance bond system to consider the adequacy of current regulatory policies and processes.

Environmental performance bonds or mining securities serve to protect a State from financial liability should a mineral tenement owner fail to comply with mine site rehabilitation requirements. The review will determine whether alternate financial instruments such as insurance could optimise flexibility for the minerals industry whilst maintaining acceptable levels of financial risk for the State and the Minister.

REVIEW

An independent review of rehabilitation techniques and success was undertaken in 2006. This review considered the success of all trials and rehabilitation undertaken on site to date to ensure that the rehabilitation methodologies used at KCGM and outlined in this Rehabilitation Management Plan are current best practice for the KCGM operation.

KCGM is required to prepare and submit an Annual Environment Report (AER) to the Department of Environment and Conservation and Department of Industry and Resources each year. The AER covers the previous calendar year and is submitted by 31st March each year.

The AER contains a section regarding rehabilitation activities. This section outlines the rehabilitation completed for the previous 12 months and that planned for the following 12 months. Also included are details on seeding, tree planting, weed control and shaft backfilling activities.

The AER also outlines the proposed studies or trials and the rehabilitation monitoring undertaken and the results of the studies, trials or monitoring. It is intended that the AER is used to detail specific rehabilitation projects and timelines and the results of these projects, studies or trials. Based on the outcomes of the projects, studies or trials it is recognised that a review of this Rehabilitation Management Plan may be required to ensure that this Plan reflects site best practice for rehabilitation.

Following submission of the AER, a site visit by the Department of Industry and Resources will follow. The site visit is intended to:

- Discuss any issues raised in the AER;
- Carry out an Environmental Performance Review of the operation;
- Re-assess the Bond amount current on the site; and
- Verify the AER.

This site visit may also identify further projects, studies or trials to be considered by KCGM.

SPECIFIC REHABILITATION TASKS

Task	Description	Timing
Materials Characterisation	Further geochemical characterisation as recommended in ARD study.	2007
Topsoil Management	Growth medium material balance to be reviewed and apportionment of material to rehabilitation areas (including prioritising topsoil on western slopes).	2007
	Southern noise bund stockpile to be ripped and seeded.	2007
	Further soil analysis test work.	2007
	Topsoil recovery and management for noise bund realignment.	2007
Waste Rock Dump Rehabilitation	Removal of excess growth medium of upper lift of Croesus Noise bund; links in with noise bund realignment activity (wind dependent).	2007/2008
	Reworking of the water control features and repairing erosion (i.e. OTD/Radio Hill)	2007
	Reworking of the 25° slope (~1 ha) on the Trafalgar WRD to a 20° slope keyed in with surroundings.	2007
Tailings Storage Facility Rehabilitation	Continue rock armouring around Fimiston I TSF; investigate removal of excess growth medium.	2008
Monitoring	Monitoring the rehabilitation performance and undertaking remedial works where required.	Ongoing
	Use the Land Function Analysis (LFA) to monitor the progress of rehabilitation.	Ongoing
Bonds	Continue to work with the DoIR to determine if a more streamlined process can be developed.	2007

DISTURBANCE SUMMARY AND REHABILITATION SCHEDULE

In 2007 a detailed review of disturbance type per waste rock dump and tailings storage facility at the KCGM operations was undertaken. This review calculated the disturbance (footprint and surface area) and rehabilitation status for waste rock dumps and tailings storage facilities at the KCGM operations. This included actual disturbance to the end of 2006 and a summary is outlined below:

Historically Disturbed Areas
Rehabilitation of historically disturbed areas was the initial priority of the KCGM rehabilitation programme which commenced in 1991.

This programme is known as “Greening the Golden Mile” which aimed to create a green belt or buffer between the City of Kalgoorlie-Boulder and the mining operations. Since 1991, more than 210,000 trees have been planted and 730 hectares (ha) rehabilitated, these areas all have well established vegetation.

Rehabilitation of historical disturbance represents a significant proportion of KCGM rehabilitation to date and can be seen on Figure 3 (represented as non-bonded rehabilitation areas). The majority of historically disturbed areas have now been rehabilitated, and historical disturbance was not included in the review of disturbance and rehabilitation.

Other Disturbed Areas
There are a number of other much smaller disturbance areas which will require rehabilitation. These areas include plant sites and workshops, borefields and pipelines laydown areas and roads or access tracks.

These areas will be required for the life of the operation and so will not be rehabilitated until mine closure. However if any areas or infrastructure are decommissioned prior to closure then these will be rehabilitated as soon a practicable.

Figure 3 - KCGM Rehabilitation Areas Location Plan
Rehabilitation Completed 1991 - 2006

Tailings Storage Facilities
There are around 625 ha of tailings storage facilities (TSFs) across the KCGM operations.

All of the Mt Percy TSF has been rehabilitated prior to 2005 and shows good performance with established vegetation and little erosion.

TSFs and associated infrastructure at Fimiston and Gidji are currently operational and are anticipated to be in use for the remainder of mine life. Therefore final rehabilitation of these facilities will occur after closure.

Some progressive rehabilitation of the outer embankments has occurred at the Fimiston TSFs and vegetation is in early stages of establishment. The historical Paringa TSF will be covered by the Fimiston waste rock dumps.

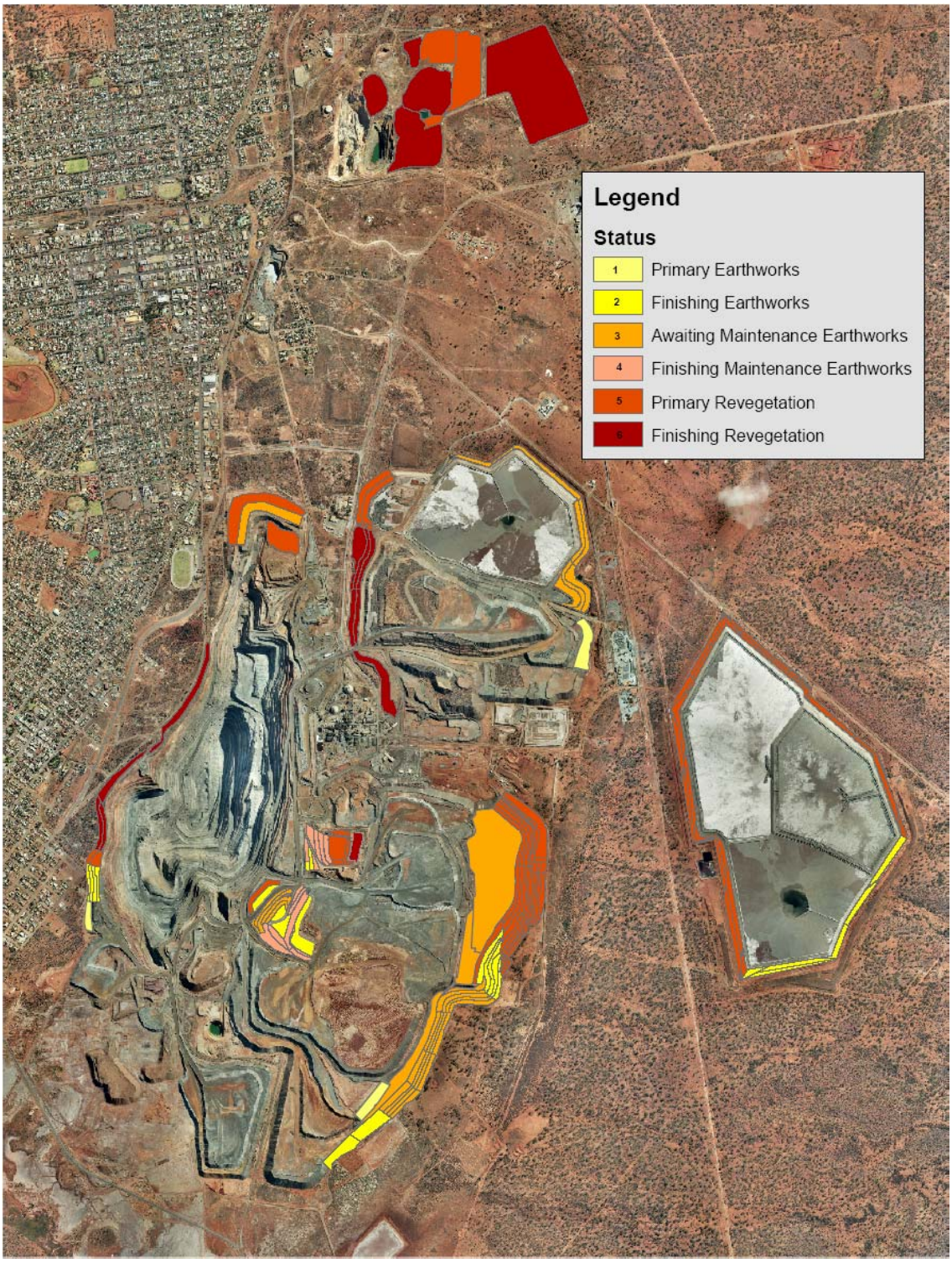
There is also 2 ha of historical tailings at the Australian Miners and Prospectors Hall of Fame (AMPHOF) which will not be rehabilitated but left in-situ for historical value. However some tree seedlings have been planted on the top of the TSF to assist with dust control.

The following table indicates for tailings storage facilities (not including the AMPHOF TSF) the total footprint and surface area to be rehabilitated (at the end of 2006), the status of the completed rehabilitation and a rehabilitation completion percentage. Figure 4 shows the status of rehabilitation (bonded areas) at KCGM. It must be noted that the surface area does not represent the total area available for rehabilitation as construction is not yet completed.

Rehabilitation Status (As at 31 July 2007)	**Footprint Area (ha)**	**Surface Area (ha)**	**Landform Completion Percentage**
Tailings Storage Facilities	**625 ha**	**646 ha***	**21%**
1: Primary Earthworks i.e. reshaping (battering)		0	0%
2: Finishing Earthworks i.e. topsoil spread, ripping, drainage		15	2%
3: Awaiting Maintenance Earthworks i.e. erosion evident		18	3%
4: Finishing Maintenance Earthworks i.e. erosion control repaired		0	0%
5: Primary Revegetation i.e. seeding and some vegetation		49	8%
6: Finishing Revegetation i.e. significant vegetation established		55	8%
7. Relinquishment i.e. closure criteria met and all bonds returned		0	0%

* This includes all remaining areas including some areas that will not be available for rehabilitation until mine closure.

Figure 4 - KCGM Status of Completed Rehabilitation (Bonded Areas)



Waste Rock Dumps

At the end of 2006 there were around 1001 ha of actual waste rock dumps (WRDs) or low grade stockpiles across the KCGM operations. The majority of these dumps are associated with the Fimiston Operations. The waste dumps at Mt Percy have been rehabilitated prior to 2005 and show good performance with established vegetation and are stable with little erosion.

Construction of the Fimiston waste rock dumps continues and to date rehabilitation has focussed on the outer faces as these are the available areas. Although the outer faces do not represent a large number of hectares, the time, complexity and cost of rehabilitation of these areas is higher than the flat areas and are important to be completed.

At Fimiston, once areas have been made available for rehabilitation this is undertaken as soon as practicable. In 2007 and 2008 there is a focus on reworking some rehabilitation areas (Rehabilitation Status 3 and 4) which have been completed but require modifications to repair design problems.

Some of the waste rock dumps at Fimiston are low grade stockpiles which are likely to be processed through the Fimiston Mill. There is also an area on the waste rock dump which is used as the stockpile area for topsoil or growth medium material. Waste rock will also need to be removed from the dumps to cap the Fimiston TSFs after closure. Therefore these areas will not be available for rehabilitation in the short term and will be rehabilitated nearer to (or after) mine closure.

The following table indicates for all waste rock dumps the total footprint and surface area to be rehabilitated (at the end of 2006), the status of the completed rehabilitation and a rehabilitation completion percentage. Figure 4 shows the status of rehabilitation (bonded areas) at KCGM. It must be noted that the surface area does not represent the total area available for rehabilitation as construction is not yet completed.

Rehabilitation Status (As at 31 July 2007)	**Footprint Area (ha)**	**Surface Area (ha)**	**Landform Completion Percentage**
Waste Rock Dumps (includes noise bunds)	**1001 ha**	**1128 ha***	**26%**
1: Primary Earthworks i.e. reshaping (battering)		9 ha	1%
2: Finishing Earthworks i.e. topsoil spread, ripping, drainage		30 ha	3%
3: Awaiting Maintenance Earthworks i.e. erosion evident		86 ha	8%
4: Finishing Maintenance Earthworks i.e. erosion control repaired		15 ha	1%
5: Primary Revegetation i.e. seeding and some vegetation		81 ha	7%
6: Finishing Revegetation i.e. significant vegetation established		66 ha	6%
7. Relinquishment i.e. closure criteria met and all bonds returned		0 ha	0%

* This includes all remaining areas including some areas that will not be available for rehabilitation until mine closure e.g. waste rock used for capping TSFs and low grade stockpiles.

Progressive rehabilitation of waste rock dump areas is the key priority over the next 10 years. During this time as sections of the waste rock dumps reach final height there will be an increase in the available hectares for rehabilitation. This increase in hectares is primarily related to the availability of flat areas.

The 2007 Life of Mine Plan (LoMP) current 5 year rehabilitation schedule is shown in the table below and areas are shown on Figure 5. It is important to note that these areas may be subject to change based on revisions of the LoMP. KCGM is committed to progressive rehabilitation and where practicable, if significant changes are made to the LoMP, every effort will be made to make rehabilitation areas of equivalent significance available.

Waste Rock Dump Rehabilitation Schedule	Rehabilitation (Surface Area)	Total Footprint Area	Total Surface Area	Landform Completion Percentage
Rehabilitation 2007* * area still to be completed	8 ha	1001 ha	1128 ha*	1%
Rehabilitation 2008	60 ha	1057 ha	1188 ha*	5%
Rehabilitation 2009	74 ha	1105 ha	1262 ha*	6%
Rehabilitation 2010	36 ha	1129 ha	1298 ha*	3%
Rehabilitation 2011	159 ha	1228 ha	1457 ha*	11%
Total Waste Rock Dump Rehabilitation by end 2011 (624 ha)				**44%**

* This includes all remaining areas including some areas that will not be available for rehabilitation until mine closure e.g. waste rock used for capping TSFs and low grade stockpiles.

Figure 6 shows the combined actual and proposed rehabilitation areas from 1991-2011.

Figure 5 - KCGM Rehabilitation Schedule 2007 to 2011

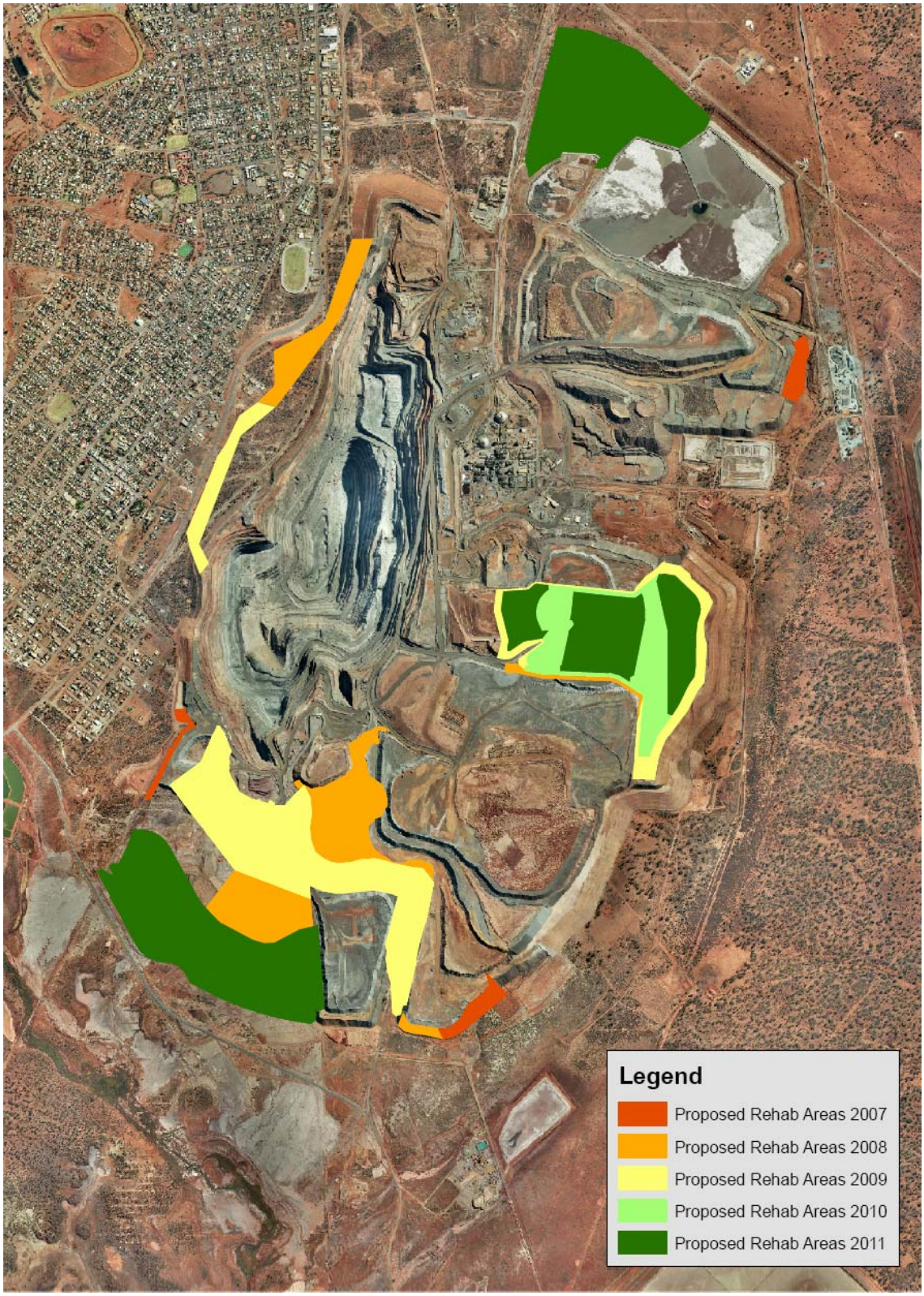
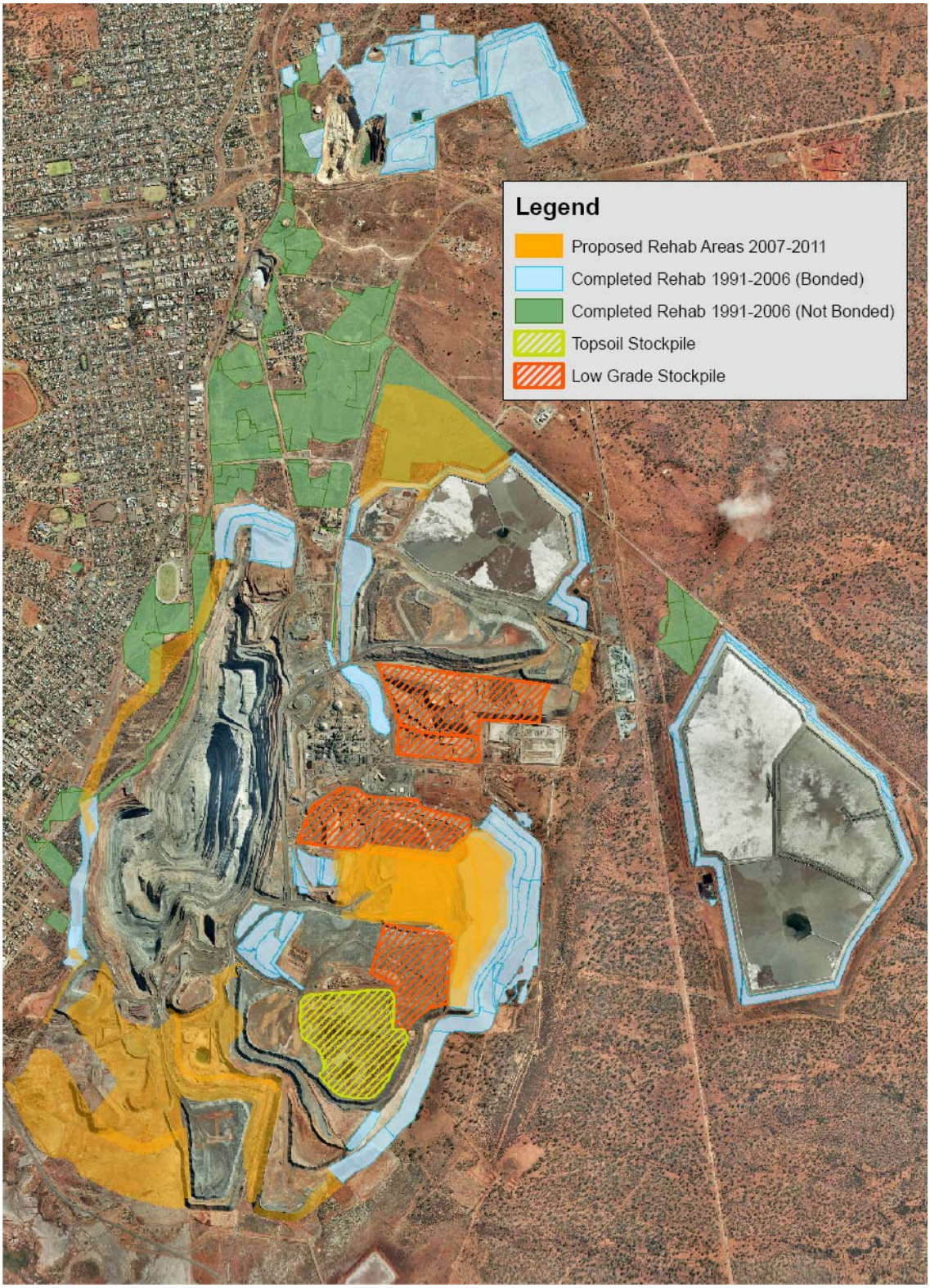


Figure 6 - KCGM Actual and Proposed Rehabilitation Areas 1991 to 2011



APPENDIX A – REHABILITATION TRIAL RESULTS

The independent review of rehabilitation techniques and success considered the success of all trials and rehabilitation undertaken on site to date.

The outcomes of these trials are outlined below and have formed the basis of the rehabilitation methodologies used at KCGM and outlined in this Rehabilitation Management Plan are current best practice for the KCGM operation.

Growth Medium Trials

In 1993 a trial was established to investigate the effect on revegetation success and erodibility of varying topsoil depth. Waste rock was covered with varying depths of oxidised waste (0 cm, 50 cm and 100 cm) and varying depths of topsoil (0 cm, 10 cm and 20 cm of topsoil).
There were no statistically significant differences between the different depths of oxidised waste or topsoil. However, there were some visual trends noted and poor results with no topsoil were evident.

The conclusions that can be drawn from this trial are that:

- A 10 cm layer of topsoil is difficult to spread over a rocky surface and will often get caught up on larger rocks, resulting in an uneven distribution of soil. A 20 cm layer is therefore preferable; and
- Initial monitoring did not reveal any statistically significant differences in the level of revegetation success with different thicknesses of oxide, however, root growth probably had not reached 0.5 m. It is likely that 1 m of oxidised waste will provide a better water holding rooting zone for maintenance of deep rooted plants than would 0.5 m.

Sheeting trials were conducted on the waste rock dumps at Fimiston. Based on observations surface sheeting was considered moderately successful. It appeared that the highest stem densities and greatest plant cover were on treatments of oxide sheeting 50 cm or more in thickness.

However, these communities were thought to be only ‘meta-stable’ with a high potential for collapse under drought, extreme storm events or other disturbances, and the surface covers tended to erode. The erosion of oxide wastes was considered of particular concern due to the saline and sodic nature of this material. There is high potential for very significant salt accumulation (through erosion and leaching) at the base of the dumps when thick oxide waste sheetings are used.

In contrast to treatments with thick surface sheeting, the use of no sheeting or only thin sheetings of topsoil appeared to have lower stem densities, however a greater proportion of perennial individuals and greater biomass per individual plant. Although these communities tended to have less surface vegetation and appear ‘patchy’, these characteristics were considered closer to native plant communities in the area.

Mulching Trials

In 1994 a trial was undertaken to investigate the effect upon revegetation success (and erodibility) by varying the depth of the topsoil layer and presence or absence of mulch material. Topsoil was applied in 10 cm and 20 cm.

The mulch used for the trial was the unwanted vegetation left by the timber cutters when they removed the tree trunks from a site before vegetation clearance and topsoil stripping was undertaken. Smaller branches were transferred to the rehabilitation area after contour ripping and seeding as the pieces of timber interfered with the ripping tynes. Manual cutting and spreading of the mulch was undertaken. The significant walking required over the slope tends to interfere with the integrity of the rip lines. This trial indicated:

- Application of mulch did not appear to significantly improve revegetation success. The mulch resource is also expensive and difficult to apply without affecting the integrity of the rip lines; and
- There were no statistically significant differences in plant density, species diversity or canopy cover with the two topsoil depths.

Fertiliser Trials

In 1994 eleven different fertilisers or combinations of were trailed on the Mt Percy tailings storage facility. Results indicate no significant differences in plant density, cover or species present with the different treatments and certain fertilisers may promote weed cover. It is also known that the addition of fertiliser may lead to increased levels of soluble salts in the soil.

APPENDIX B – CONCEPTUAL MINE CLOSURE STRATEGY

In summary, the Conceptual Mine Closure Strategy addresses the following elements:

- Closure Objectives;
- Commitment and Legal Obligations;
- Operational Overview;
- Stakeholder Involvement;
- Risk Assessment;
- Closure Planning;
- Financial Provisioning;
- Proposed Land Use;
- Closure Timetable;
- Closure Criteria; and
- Development of Closure Plans.

Due to the size and spatial spread of operations and the degree of historical mining activity on KCGM's leases, KCGM will develop a series of Closure Plans for different aspects of the operation. Different closure timing of some aspects of the operation will also influence the development of these plans.

For example, separate closure plans for the Gidji and Fimiston Operations may be more applicable than creating one closure plan for the entire operation, as many of the areas may be at various stages of closure or continued operation before the expected end of mine life of 2017. Closure Plans will be developed at least three years prior to closure, in line with the ANZMEC Strategic Framework for Mine Closure.

KCGM aims to commence the development of Preliminary Site Specific Closure Plans within at least five years prior to closure, with the aim of finalising the Site Specific Closure Plans at least 3 years prior to closure. Community and regulatory consultation will be undertaken between the release of the preliminary closure plan and the finalisation of the site specific closure plans.

Additional plans will also be developed to provide support for closure operations at various levels. The summary of the closure documents which will be prepared is outlined below:

- Conceptual Mine Closure Strategy – January 2006, review every 3 years;
- Rehabilitation Management Plan – January 2008 review annually;
- Community Consultation Strategy – commenced with release of KCGM's Concept Plan Sharing Our Vision for the Future, reviewed in December 2007 and then every 2 years;
- Community Consultation Plan – 5 years prior to closure, review every 2 years;
- Mine Closure Plan – April 2010, review every 2 years;
- Preliminary Site Specific Closure Plans – 5 years prior to closure, review every 2 years;
- Final Site Specific Closure Plans – 3 years prior to closure;
- Employee and Business Transition Plans – 3 years prior to closure, review annually;
- Decommissioning Plan – 12 months prior to closure; and
- Maintenance and Monitoring Plan – 12 months prior to closure for a minimum of 5 years post-closure.