KCGM HSSE DEPARTMENT, CLOSURE

KCGM Mine Closure Plan 2022 (v1)
Volume 2 of 3

Mineral Field 26

October 2022

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9. CLOSURE IMPLEMENTATION

This section describes planned closure implementation works required to address the risks presented in Section 7.5.2 (Volume 1), many of which are informed by the closure data and studies/projects described in Section 7 (Volume 1).

The structure of this chapter is as follows:

- Section 9.1.1 provides an overview of the site as a whole; closure strategy and criteria relevant to whole of site are outlined in this section.
- Sections 9.1.3 to 9.5.3.6 describe implementation designs and prescriptions.
- Section 9.7 provides a consolidated schedule of implementation together with the current progress of closure works since the last MCP.

9.1 Site wide Closure Implementation

9.1.1 Closure Strategy

KCGM is unique in the Western Australian mining industry due to its size and close proximity to the City of Kalgoorlie-Boulder, a community of approximately 30,000 people. KCGM is required to comply with stringent regulatory approval conditions and consider local stakeholder expectations during planning, operations and closure. The regulatory regime in which KCGM operates is primarily driven by its proximity to residential areas rather than unique biodiversity values (historical mining and mineral processing has significantly degraded the immediate environment). Most of KCGM is not located on pastoral stations, with the exception of some of the borefields, Gidji Operational Area and the eastern portion of the Fimiston IIE TSF (expansion of the Fimiston II TSF).

KCGM has taken a risk based approach to prioritisation of work (tasks and studies) undertaken for closure since the first MCP in 2010.

Due to the interconnectedness of the site, it is easier to manage the Closure Tasks and Rehabilitation Activities using a single management tool. For this reason, scheduled tasks and rehabilitation are summarised in Section 9.7 as a consolidated schedule, with their priority reconsidered every three years, or when there is another trigger, such as a new approval or change to LOM.

KCGM continually undertakes focused closure studies to provide the science behind final closure designs. Implementation is a continuous improvement process, integrating learnings from site specific implementation experience or performance of progressive rehabilitation into design or implementation improvements. This is an iterative process and entails often complicated option assessments to establish the most beneficial long term strategy, with planned final closure still more than 12 years away.

KCGM undertakes progressive rehabilitation of areas that are at final design and available for rehabilitation, with a well established process in place. Approximately five years (aligned with closure planning cycle) out from final closure, a detailed implementation plan will be developed for aspects that require detailed scheduling/ studies that can only be conducted closer to end of mine life; for example contaminated sites investigations, the requirements of agencies such as Department of Planning, Lands and Heritage and other aspects that will require implementation level designs, planning and permitting requirements.

9.1.2 Closure Objectives and Criteria applicable to whole of site

Some closure objectives and criteria committed to by KCGM are applicable on a site wide management level, and are not discussed or listed for each Domain. Examples include maintenance of existing safety systems, compliance with regulatory requirements and stakeholder consultation (Table 9-1). These closure objectives and associated criteria will continue on for closure from existing operational systems and processes.

Table 9-1: Closure Objectives and Criteria with site-wide applicability

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe	Site closure activities are completed in a manner which ensures the safety and health of workers.	Standard Industry OHS procedures and standards to be adhered to during all stages mine closure.	All operations	Current WA mine industry OHS standards.	KCGM safety systems and procedures implemented for any closure related physical works/activities in compliance with Mines Safety Act.
Legal Compliance	Maintain compliance with all legal and other requirements during the closure planning and implementation process.	Maintain existing closure obligations register (Appendix 1), and incorporate into closure planning to ensure compliance.	All areas	Compliance with all legal obligations as documented in the MCP Closure Obligations Register	Reviewed and updated Legal Register provided in 3 yearly MCP. Legal compliance audit in final relinquishment report/MCP.
Closure Planning	Cost effective and timely closure planning and implementation	Application of current mining industry rehabilitation techniques suitable to the site conditions and constraints of the post mining environment. Maintain records of rehabilitation, in the event that a 3rd Party peer review is required for signoff. Undertake continuous improvement of rehabilitation techniques where possible, recorded in the MCP.	All Areas	Rehabilitation deemed appropriate as per 3rd party review and regulatory sign off of MCP.	Regulatory approval of triennial MCP. 3rd Party review of rehabilitation methods may be recorded in Final Relinquishment Report.
Closure Planning		Implementation of a progressive rehabilitation schedule.	All Areas	Implementation of progressive rehabilitation within the constraints of mine development reported annually in AER and triennially in MCP.	Record of proposed and completed progressive rehabilitation in the MCP and AERs.
Closure Planning	Adequate closure provision is made to cover all agreed to	Effective resourcing of annual update of Closure Cost Estimate, 3-yearly MCP update/review, preparation of final Mine Relinquishment Report and post	All Areas	Closure Provision costing to Australian mine industry standards.	Annual 3rd Party audit of KCGM of closure cost model.

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
	closure commitments.	closure rehabilitation performance monitoring and maintenance.			
Stakeholder Consultation	KCGM's key stakeholders will be consulted in relation to post closure outcomes.	Key Regulatory stakeholders are provided with an opportunity to comment on a 3-yearly frequency through the MCP resubmissions. Consultation with Department of Lands, Heritage and Planning from approximately 5 years prior to closure.	All Areas	Submission of triennial MCP, which considers feedback from Key Regulatory stakeholders.	Approval of MCP.
	Community stakeholder representatives will be engaged in relation to post closure outcomes.	Routine community consultation through tools such as Local Voices or the Community Reference Group will include closure planning aspects.	All Areas	Where appropriate, community consultation and outcomes reported in MCP.	Record of consultation and outcomes included in MCP.
		Inclusion of closure objectives will be included into discussions with representatives as per the Aboriginal Engagement Strategy.	All Areas		
Sustainable Land Use		Weed control on landforms during closure and rehabilitation performance monitoring period.	All areas	Management of Declared Weeds or Weeds of National Significance on landforms.	Rehabilitation performance monitoring includes identification of Declared and National Significance weeds.

9.1.3 Premature Closure – site-wide strategy

In the event of unexpected or temporary closure of KCGM, a re-evaluation of closure works will be conducted to prioritise and identify essential tasks. These are likely to be tasks with a strong focus on safety. Upon decommissioning, closure activities will be completed in accordance with Section 9 of the MCP, but with a compressed timeline.

In the event of all or part of the Operational Areas moving into a care and maintenance phase (this may be for months or years) the site will be managed under the existing Environmental Management System framework until such time as the Care and Maintenance Plan (CMP) is formulated and agreed to with DMIRS and DWER.

In the development of the CMP, the following will be considered:

- Commitments in key approvals;
- Maintain existing safety systems;
- Ensure safety obligations required under section 42 and 88 of the *Mines Safety and Inspection Act 1994* relating to mine suspension or abandonment are met:
    - Section 42 (1) of the Act (Commencement or suspension of mining to be notified);
        - the principal employer of the manager of a mine must, in accordance with the regulations, notify the district inspector for the region in which the mine is situated –

          (c) before mining operations are abandoned; or

          (d) before mining operations are suspended.
    - Section 88 (1) of the Act (Plans of mine at its abandonment or suspension) determines that;
        - where mining operations are about to be abandoned or suspended, the principal employer, or if a receiver has been appointed in respect of a principal employer, that receiver, or the manager must cause to be prepared to the satisfaction of the district inspector for the region in which the mine is situated and accurate plan or plans of the mining operations to the time of abandonment or discontinuance and must furnish that plan or those plans to the State mining engineer in accordance with the regulations before the mining operations are abandoned or suspended.
- Undertake a review the Operational Area to determine the status (environmental risk);
- On cessation of mining, removal of all mobile machinery/plant/equipment from underground and open pit(s) to the surface where it is to be washed down and parked up;
- Continue to maintain DWER licence compliance, in particular, management of groundwater levels in borefields associated with operational TSFs;
- Maintain perimeter security fencing, with access control;
- If viable, process the remaining ore stockpiles;
- Clean the ore bins, conveyor system and crushing and processing plants. Flush and wash down all areas prior to lubricating machinery;
- Where possible return any excess stores, lubricants, fuels, chemicals, spares, etc. to suppliers;
- If no longer required, flushing of all tailings disposal pipelines, storage tanks and bins;
- Reducing fuel storage levels to that required by the remaining skeleton crew;
- Maintain the TSF decant pump off systems to ensure adequate freeboard on the tails dam at all times;
- Maintain all water ponds at levels such that they have sufficient storage capacity to contain a 1:10 year 24 hour storm event;
- Maintain the buildings and infrastructure, including main access roads, in working order;
- Establish additional emergency response action plans, if monitoring indicates that there is a potentially serious environmental or safety issue; and

- Regular monitoring and reporting to the DMIRS and other government agencies carried out during operations will need to be continued through the care and maintenance stage.

9.2 Fimiston Closure Domains – MS 782

The following closure prescriptions are based on the assumption that KCGM's final land use objective is 'modified landforms', without precluding future mining in prospective areas on the Golden Mile (ref Vol 1, Section 6.1). If this final objective should change due to new economic opportunities or other reasons, these prescriptions may require adjustment.

During rehabilitation and demolition activities, it may be necessary to establish temporary laydown and stockpile areas, which will be rehabilitated after use. A disposal area within the waste dump will be necessary for large pieces of concrete or other inert items. The location of this storage area is likely to be in close proximity to the Fimiston Plant. Appropriate licensing for the disposal of waste will be sought. Appropriate licensing for usage of the Fimiston Open Pit for groundwater discharge will also be obtained.

9.2.1 Fimiston Standard Closure Prescriptions

This section outlines the standard decommissioning and rehabilitation methods that will be utilised during closure of the Fimiston domains and features in order to ensure that the requirements of the closure objectives and post closure land use are met. The standard decommissioning and rehabilitation approach for Fimiston closure domains is presented in Table 9-2. Those areas that are simple to rehabilitate and pose a low risk, such as laydowns, are not discussed in any further detail than presented in Table 9-2.

Table 9-2: Standard Decommissioning and Rehabilitation Approach for Fimiston Operational Area

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
Domain: Fimiston Mining Infrastructure		
Fimiston Open Pit and Sam Pearce Decline	• Decommission Fimiston Open Pit dewatering bore and salvage equipment; • Implement TSF seepage management water pipeline to the pit, ensuring that the discharge is at a geotechnically appropriate location and low down in the pit; • Update water management approvals as required; • Implement risk based approach to prevention of inadvertent access in open pit areas, as required by *Mines Safety and Inspection Regulations 1995* - if not already completed, complete abandonment bunding and/or other measures; • Implement engineered seals for declines and portals, buttressed with mine waste • Initially, limit pit access, but still allow geotechnical and water management access to the pit for inspections and monitoring; • Review geotechnical considerations and implement the post closure monitoring accordingly; and • Close and remove the public lookout at the end of geotechnical monitoring. • At final closure, paddock dump waste on upper pit access ramps to prevent vehicle access.	Restricted access due to Safety Seal decline and portals
Ore Stockpiles and ROM Pads	• Process or sell remaining ore stockpiles or rehabilitate *in situ;* • Scrape off upper 150mm of ROM pad and either process the material or bury • Profile outer batters of ROM and stockpiles to less than 20 degree slope angles, to reduce long term erosion and promote stability; and • Rip on the contour and seed with native species if the area is identified for revegetation.	Modified landscape[1]
Crushing Facilities	• Dismantle/demolish all structures to below ground level unless specified otherwise; • Break up concrete and bury or dispose of; • Break up scrap metal and recycle where possible; • Reshape surface where required; and • Cross rip and seed with native species if the area is identified for revegetation;	Modified landscape

[1] KCGM defines 'landscape' as the combination of abiotic (landform materials, surface water flow etc.) and biotic (vegetation and fauna) aspects of a rehabilitated area.

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
Fuel Farm	• Investigate potential contamination; • Run down fuel levels at completion of post closure activities; • Decommission fuel system; • Dispose or remediate contaminated material as per *Contaminated Sites* requirements; • After decontamination and making safe (particularly electrical risks), implement demolition; • Break up scrap metal and recycle where possible; • Break up concrete and other components that will hinder rehabilitation success, bury or remove as per DWER waste disposal requirements; • Reshape surface, cap with waste rock and sheet with rehabilitation materials where required (if available); and • Cross rip and seed with native species if the area is identified for revegetation.	Modified landscape
Laydowns	• If required, investigate potential contamination; • Dispose or remediate contaminated material as per *Contaminated Sites* requirements; • Break up scrap metal and recycle if present; • Dispose of assets: offer to other sites within the company or auction; • Break up hard stand area; • Reshape surface and sheet with rehabilitation materials where required (if available); and • Cross rip and seed with native species if the area is identified for revegetation.	Modified landscape
Offices, Car parks, LV Roads and Gardens	• Retain native garden areas; • Remove buildings and other infrastructure; • Break up hard stand area; • Remove or bury tarmac, concrete and other components that will hinder rehabilitation success, bury or remove as per DWER waste disposal requirements; • Reshape surface where required, cover with rehabilitation material (if available); and • Cross rip and seed with native species if the area is identified for revegetation.	Modified landscape
Mining Maintenance Workshops	• Run down oils and other consumables at completion of post closure activities; • Decommission oil systems;	Modified landscape

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
	• Investigate potential contamination; • Dispose or remediate contaminated material as per *Contaminated Sites* requirements; • After decontamination and making safe (particularly electrical risks), implement demolition; • Break up concrete or hard stand areas, bury or dispose of as per DWER requirements; • Dismantle/demolish all structures to below ground level unless specified otherwise; • Break up scrap metal and recycle where possible; • Reshape surface where required; and • Cross rip and seed with native species if the area is identified for revegetation.	
Domain: Fimiston Waste Dumps		
Southern (Trafalgar, Oroya, Eastern, Far Eastern) Northern, North Eastern (Central), Environmental Noise Bund	• Implement the Visual Amenity Concept; • Encapsulation of historic TSFs and TSF footprints that are within the waste dump footprint; • Conduct progressive rehabilitation on available areas. For new rehabilitation: • Profile outer batters of landform to reduce long term erosion and promote stability; • Construction of robust crest bunds; • Where appropriate, profile upper surface for water control; • Cover outer surface with appropriate growth medium as per Visual Amenity Concept (if available); and • Cross rip to ensure correct rock cover on surface, and seed with native species. For The Fimiston South project operational noise bund: • Use material to construct the western portion of the abandonment bund, outside the zone of instability; • Remove excess material within ZOI; and • Rehabilitate the portion (southern section) of the operational noise bund that is outside the ZOI. For existing rehabilitation: • Specifications in alignment with original approvals.	Modified landscape

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
Domain: Fimiston Mineral Processing Infrastructure		
Plant and Support Infrastructure	• Run down reagent inventory and hydrocarbons prior to closure date; • Salvage remaining gold from plant; • Remove buildings and other infrastructure; • Investigate potential contamination; • Dispose or remediate contaminated material as per *Contaminated Sites* requirements; • Cyanide decontamination of plant and equipment as per Cyanide Decommissioning Plan; • After decontamination and making safe (particularly electrical risks), implement demolition; • Dismantle/demolish all structures to below ground level unless specified otherwise by appropriate approvals; • Break up hard stand areas; • Break up concrete and other components that will hinder rehabilitation success, bury or remove as per DWER waste disposal requirements; • Break up scrap metal and recycle where possible; • Reshape surface where required; • Cross rip and seed with native species if the area is identified for revegetation; and • Dispose of assets: offer to other sites or auction.	Modified landscape
Domain: Fimiston Tailings Storage Facilities		
Fimiston I, Fimiston II, Kaltails, Fimiston IIE, Fimiston III TSFs	• Remove piping, decant pumps and other infrastructure; • Allow sufficient drying time (estimated 2-3 years); • Profile outer embankments (except geotechnical buttresses) to reduce long term erosion and promote stability; • Cover outer slopes and surfaces with appropriate waste rock for erosion protection; • Upper surface of TSF to be reshaped for water retention and capped with appropriate material for dust management; • Construction of robust crest bunds; • Cross rip and seed with native species if identified for revegetation; • Maintain fencing to restrict access to TSF until relinquishment or no longer required; • Consider blocking ramps to restrict longer term access by vehicles, which could promote erosion;	Modified landscape Potentially fenced for monitoring period to Restricted access Excluding pastoral usage

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
	• Continue seepage and groundwater dewatering (and dispose of abstracted seepage within the Fimiston Open Pit) until monitoring confirms that active management is no longer required; and • Backfill all seepage trenches and ponds when no longer required.	
Tailings Delivery and Decant Water Return Lines (including bunds)	• For above ground pipelines, flush and remove and sell, recycle where possible, or dispose (as per DWER requirements) unless specified otherwise; • For buried pipelines (deeper than 0.5m), flush and leave buried unless they pose a future risk; and • Remove windrows and reinstate natural drainage along pipeline corridors and re-vegetate as appropriate.	Modified landscape
Domain: Water Abstraction and Containment Facilities		
Lined Water Storage Dams	• Slash liner and bury during backfilling of dam; • Reshape surface (mounded for a water shedding profile) where required; and • Cross rip and seed with salt tolerant native species if the area is identified for revegetation.	Modified landscape
Water Supply Tanks	• Remove tanks and either sell or dispose of (as per DWER requirements); • Break up concrete bases and bury or dispose of; • Reshape surface where required; and • Cross rip and seed with native species if the area is identified for revegetation.	Modified landscape
Seepage Recovery and Water Supply Bores	• Retain as required during post closure period for seepage recovery; • Once no longer required, decommission as per DWER guidelines; or • Retain and transfer to a third party.	Modified landscape
Monitoring Bores	• Retain selected bores for compliance monitoring during post closure period; • Once no longer required water bores are to be decommissioned as per DWER guidelines; • Remove surface casings, collar and plug hole, mound dirt over plugged hole; • Reshape surface where required; and • Cross rip and seed with native species if the area is identified for revegetation.	Modified landscape
Pipelines	• For above ground pipelines, flush and remove and sell or recycle where possible, or dispose (as per DWER requirements) unless specified otherwise;	Modified landscape

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
	• For buried pipelines (0.5m or deeper), flush and leave buried unless they pose a future risk; and • Reinstate areas along pipelines and re-vegetate as appropriate.	
Domain: Access Roads and Service Corridors		
Power/Gas Supply Lines	• For above ground lines, sell if possible or dispose of unless specified by appropriate approvals; • For buried lines, leave buried unless they pose a future risk; and • Reinstate natural drainage along routes and re-vegetate as appropriate.	Modified landscape
Roads and Tracks	• Remove windrows and reinstate natural drainage function; • Rip sealed roads and dispose of material appropriately; • Rip unsealed roads unless specified otherwise; • Sheet with rehabilitation material where available; and • Seed with native species. • For TSF Haul Road, dig off material for TSF rehabilitation; ensure natural drainage is reinstated but removal of culverts and mounding material in locations outside flow paths; cover with local soil as far as practicable; Cross rip and seed with native species.	Modified landscape
Domain: Exploration		
Drill Holes	• Drill hole rehabilitation to be completed as part of operations, including removal of sample bags; • Conduct an audit to verify status; If not: • Collar and plug hole; • Mound dirt over plugged hole; and • Rip or scarify and seed with native species, if required.	Modified landscape
Domain: Miscellaneous		
Rehabilitation Materials Stockpiles	• Reshape surface where required; and • Cross rip and seed with native species if required.	Modified landscape

9.2.2 Fimiston Mining Infrastructure Domain Work Program

9.2.2.1 Description of Domain

Figure 9-1: Fimiston Mining Infrastructure Domain (current)

The features of the Fimiston Mining Infrastructure domain will remain active mining areas until 2035 (BP2023 LOM). Thereafter, a portion of the features are likely to remain operational during during closure works (Table 9-3),

allowing existing areas of disturbance to be used for closure works and laydown areas. The estimated final closure time frame is 2037 for major earthworks.

Table 9-3: Disturbance and estimated closure implementation dates

Fimiston Mining Infrastructure features	Area of Disturbance	Stage of rehabilitation
Fimiston Open Pit and Sam Pearce Decline	305.3	Operational until 2034
Ore Stockpiles and ROM Pads	260 + 16.2	Operational until 2034
Crushing Facilities and Stockpiles	0.4	Operational until 2034
Fuel Farm (includes mine truck go line)	12.5	Operational until 2034
Laydowns	87.5	Operational until 2034
Offices, Car parks and Gardens	6.4	Partially operational until 2037
Mining Maintenance Workshops	12.8	Partially operational until 2037

9.2.2.2 Applicable Land Use Outcomes

The applicable land use outcomes for this domain are provided in Table 9-2 in Vol 1. Modified landscape will be the final land use for the majority of areas in the Fimiston Mining Infrastructure Domain, except the Fimiston Open Pit and Sam Pearce Decline, which will have restricted access due to safety, and a portal gate or seal at the decline access.

9.2.2.2.1 Post Mining Land Use and Closure Criteria

Closure Completion Criteria relevant to this Domain are provided in Table 9-55.

Table 9-4: Proposed post-mining land use for Fimiston Mining Infrastructure

DOMAIN	FEATURE	PROPOSED POST-MINING LAND USE
Fimiston		
Mining Infrastructure	Fimiston Open Pit and Sam Pearce Decline	Restricted access due to Safety Engineered seal at decline access / portals
	ROM Pad, Crushing Facilities and Stockpiles	Modified landscape[2]
	Fuel Farm, Mining Maintenance Workshops	
	Infrastructure areas	Modified landscape

[2] KCGM defines 'landscape' as the combination of abiotic (landform materials, surface water flow etc.) and biotic (vegetation and fauna) aspects of a rehabilitated area.

Table 9-5: Closure Completion Criteria relevant to Fimiston Mining Infrastructure Domain

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe	Inadvertent access is restricted as much as practicable to any landforms or structures that are considered unsafe.	Removal or burial of all mine structures/buildings/foundations and machinery by suitable demolition / civil company unless legal liability accepted by post mining land owner. Transfer of ownership including legal documentation agreed to within reasonable timeframe (2 years), with legal documentation completed at time of closure implementation.	Buildings and Infrastructure	The footings/foundations/anchors of all mine structures/buildings/services to be buried at least 0.5 m below the final land surface.	Compliance certification (photographic and survey data) provided by demolition contractor for submission in Final Mine Relinquishment Report.
		Construction of abandonment bunding around mine open pits	Open Pits (Fimiston, Mt Percy, Mt Charlotte)	Pit abandonment bunding complies with Mines Safety and Inspection Regulations 1995 and DMIRS 1997 Guidelines (DOIR 1997) requirements.	Abandonment / safety bund completion recorded in MCP or associated close out documents – assessment via aerial photography / DTM or site inspection by suitable professional.
		Permanent sealing of portals and vent shaft openings to U/G mine workings.	Major Underground openings	Mt Charlotte portals and vent shaft openings to underground mine workings to have an engineered permanent seal.	As-constructed engineering drawing or photographic evidence of sealing of all U/G opening seals. Completion of implementation recorded in Final Relinquishment Report, provided to Mine Safety Inspector.
		Retain emergency access ramp for pit, with reasonable danger/hazard warning signage.	Fimiston and Mt Percy Open Pits	Retain pit access ramp for geotechnical monitoring during post closure monitoring and emergency access to pit lakes, with reasonable danger/hazard warning signage.	Photographic evidence provided in MCP or associated close out documents.
Geo-Physically Stable	Open Pit wall geotechnical stability will be managed	Open Pit wall designs will have appropriate geotechnical considerations and design criteria.	Fimiston and Mt Percy Open Pits	Open Pit wall movement not to exceed rates which could compromise the calculated zone of instability.	Geotechnical post closure monitoring methods as recommended by qualified Geotechnical Engineer.

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
					Final geotechnical zone of instability assessment report by qualified Geotechnical Engineer after post mining monitoring period, with recommendations actioned. Submission of close out report to DMIRS geotechnical engineers.
Non Polluting	The landforms containing materials of concern will be managed to minimise impacts to the quality of the surrounding environment.	Operational hazardous materials management practices continued during closure operations. Chemical inventory drawn down close to closure with pipelines and vessels cleaned. Inspection prior to demolition. Implement requirements of Contaminated Sites Act for identified risk areas, analysis by competent specialists.	Mineral Processing areas – Fimiston and Gidji Mining Maintenance – Fimiston	All reagents and chemicals removed from site with any residual site contamination investigated and actioned as per the Contaminated Sites Act 2003.	As required, monitoring in accordance with Contaminated Sites requirements.
Sustainable Land Use	Rehabilitate disturbed areas to a modified landscape receptive to vegetation regrowth and recovery over time considering visual amenity and properties of available rehabilitation materials.	Vegetation attributes in rehabilitated areas to have values indicative of the target post mining land use. Salinity and other constraints on vegetation growth are acknowledged in monitoring and assessment of completed rehabilitation. These data are used to underpin the vegetation attributes criteria and understanding the performance of rehabilitation across site.	Fimiston	Fimiston operational area revegetation has values indicative of the agreed post mining land use, modified landscape, accounting for placement of rehabilitation material types (implementation of the Visual Amenity Strategy).	Rehabilitation performance monitoring using accepted vegetation monitoring techniques and measures. Includes assessment against targets values, and demonstration of the ability to become self-sustaining (as detailed in Section 10.4).

9.2.2.3 Fimiston Open Pit (including supporting infrastructure Sam Pearce Decline)

9.2.2.3.1 Closure Strategy

The Fimiston Open Pit is expected to remain as a void, which will eventually fill to around 470-490 m below the pit crest (approximately halfway) with hypersaline water after 400 years (MBS & GRM, 2021)). Post closure, the pit will remain a safety exclusion zone, surrounded by an abandonment bund outside the zone of instability. The requirements of the *Mines Safety and Inspections Regulations, 1995* restrict the land use of the final void to mining related activities, and preclude recreational or other uses.

The final pit lake water level will be approximately halfway up the wall, well below the base of oxide, in the hard rock portion of the pit. The pit lake will be a groundwater sink.

The Sam Pearce Decline is located within the Fimiston Open Pit, at RL316 m (above final pit lake level) and provides operational access to the Mt Charlotte underground workings. Once access to the Mt Charlotte mine is no longer required, the portal will be sealed to prevent access whilst allowing low volumes of groundwater discharge from the portal into the Fimiston Open Pit. Other significant KCGM-developed exploration portals will also be suitably sealed.

Rehabilitation of all areas, including laydown areas, offices, mining workshops and crushing facilities are described in Table 9-2.

Safe – Demolition of Buildings and Infrastructure

It is planned that all structures will be removed or buried in this domain by the end of closure works. If available, rehabilitation materials will be used to complete the closure works. Due to the shortage of topsoil, no topsoil has been scheduled for the Fimiston Mining Infrastructure Domain.

Safe – Inadvertent Access to Mining Areas

Access to Fimiston Open Pit will be limited, with truck dumped windrows blocking access on ramps. Emergency access will be retained, which will assist with geotechnical monitoring programmes.

Inadvertent public access to the Fimiston Open Pit after closure was a risk identified for KCGM. The *Mines Safety and Inspection Regulations 1995* require a risk based approach to prevention of inadvertent public access of the pit or other mining features. An abandonment bund with the dimensions of 5 m width and 2 m height will be established in the most practical position around the Fimiston Open Pit.

Safe – Sealing of Major Underground openings

Major underground openings such as portals and vent shafts will have engineered seals. The portal reporting to Fimiston Pit will allow for the eventual discharge of water into Fimiston Open Pit. The volume of underground water discharged is expected to be negligible (it is expected to evaporate prior to reaching the pit lake).

Geophysically stable – long term pit wall stability

Several geotechnical studies, modelling and back analyses have contributed to development of the calculation of the zone of instability for the Fimiston Open Pit. Details are provided in Sections 9.2.2.3.2 and 9.2.2.3.3.

Non polluting – Contamination

The non-polluting completion criteria are applicable to the Mining Maintenance area and fuel farm, where hydrocarbon spillage is likely to have occurred, and appropriate clean up in compliance with the Contaminated Sites Act will be required. The Domain is generally inward draining, with stormwater and groundwater reporting to the Fimiston Open Pit.

The fuel farm (including the mining go-line) and mining maintenance areas, and other areas identified as potentially contaminated sites, will require assessment at the time of closure for hydrocarbon and other chemical contamination.

Sustainable Land Use – Rehabilitation

Areas such as the ROM Pad, laydown areas and office areas will be ripped and seeded.

Rehabilitation Materials for Mining Infrastructure Domain

Due to the shortage of rehabilitation materials at Fimiston, topsoil resources have not been allocated to these areas. Local topsoil, subsoil or oxide will be used where available.

9.2.2.3.2 Fimiston Open Pit Abandonment and Geotechnical Stability

Comprehensive studies of pit wall stability were conducted for the *Fimiston Gold Mine Operations Extension (Stage 3) and Mine Closure Planning (2007) PER* and the *Mining Proposal Resubmission Fimiston Gold Mine Operations Extension (Stage 3) – Golden Pike Cutback and Northern Waste Landform, 2009* (called 'Golden Pike cutback' hereafter). These models and studies have proven to be an accurate representation of geotechnical conditions during the mining of the Golden Pike cutback, as verified by ongoing operational geotechnical assessment of pit wall stability.

Detailed geotechnical studies have also been undertaken as part of the Fimiston South Mining Proposal (2021), for the southern Ivanhoe and Great Boulder cutbacks. This work included modelling for Factor of Safety (FoS) for long term pit wall stability.

9.2.2.3.3 Pit Abandonment Assessment

Since approval of Golden Pike cutback, further significant geotechnical work has been conducted to understand the Fimiston Open Pit geotechnical mechanisms.

Operational geotechnical controls and monitoring

During operations the following monitoring systems are employed:

- *Slope Radar Monitoring*

  Quasi-real time data of slopes, with scanning every few minutes, and a backup database of more than 10 years of data.

- *Prisms on all exposed fresh rock and oxide surfaces*

  Prism measurements are taken at least 4 times per day, with an associated data set extending back to 2004.

- *Seismic System*

  Continuous monitoring of seismicity.

- *Piezometers with VWPs* installed (approx. 100 VWPs), as well as standpipes

  The piezometers network provides twice daily readings of water levels behind the pit wall, supplemented by regular stand pipe measurements.

Operational geotechnical data aiding closure geotechnical assessment

KCGM has gained comprehensive understanding of the geotechnical properties of the rock and soil/oxide mass within the footprint of the Fimiston Open Pit, together with a similar level of understanding of the major structures which are known to have a significant impact on pit wall stability. This data is being continuously updated by an on-going program of pit wall mapping, photogrammetric mapping and targeted diamond drilling programs.

The information provided by the operational monitoring systems complements this knowledge and is used to calibrate the geotechnical model in addition to:

- Back analysis of pit wall failures.
- Hydrogeological interpretation of available data sets (piezometers, stand pipes and structural geology).

In particular, back analysis of the May 2018 east wall failure revealed that the critical factors influencing this event were:

- Orientation of the basal failure surface (the Fiji/Reliance Fault) – from diamond drill and photogrammetric mapping.
- The thickness of the shale band associated with this particular fault, which meant that unlike other shale bands within the Paringa Basalt, there was relatively little silicification, resulting in lower friction angle and cohesion – from diamond drilling and associated sample testing.
- Transient water pressure which reduced the effective normal stress on the basal failure surface and on the sub-vertical release planes behind the slip – from a combination of piezometer monitoring data

demonstrating that such events are real, and the back analysis, which could not replicate the failure FoS or geometry unless the water pressure was factored in.

The knowledge gained from this event as well as back analysis of other stability issues has enabled KCGM to modify the current and future pit designs to avoid exposure of the Fiji/Reliance Fault, and also provided the impetus to commence implementing improved surface water controls, diverting water away from areas where it could infiltrate critical structures. Experience with a series of structurally-controlled instabilities during the excavation of Morrison Pit has informed the design for the orientation of the south-east wall of the Fimiston South cutback, resulting in improved (modelled) factor of safety.

This knowledge has also been used to inform the development of an improved geotechnical model for the purposes of assessing the stable zone around the pit for fine-tuning the abandonment bund position.

LOM Design of Western wall of Fimiston Open Pit

In 2015 detailed modelling of the LOM western wall design (Golden Pike cutback) was undertaken by ITASCA to verify the geotechnical stability of the LOM design.

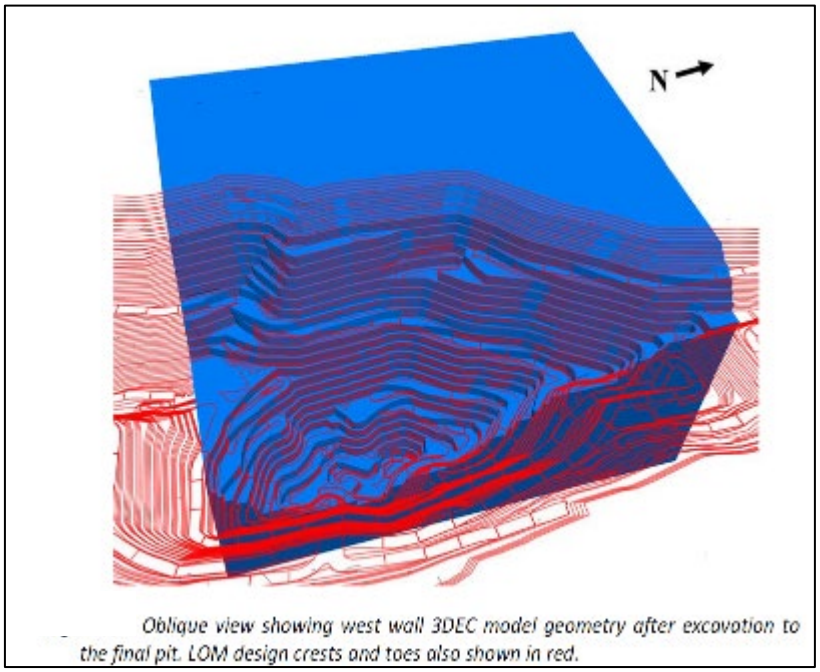


Figure 9-2: Golden Pike Area of LOM western wall of Fimiston Open Pit modelled by ITASCA in 2015

The data input included lithology, major structures, rock mass domains, remnant stopes, groundwater, excavation sequence and other parameters.

The west wall analyses predicted a factor of safety of at least 1.5, with favourable orientation of the structures considered to be a factor. Remnant stopes were not found to be a factor for pit wall stability. No medium or large scale failures were predicted by the model. Modelled outcomes were found to be consistent with previous analyses. The outcomes were also reviewed by Dr Phil Dight, who supported the findings.

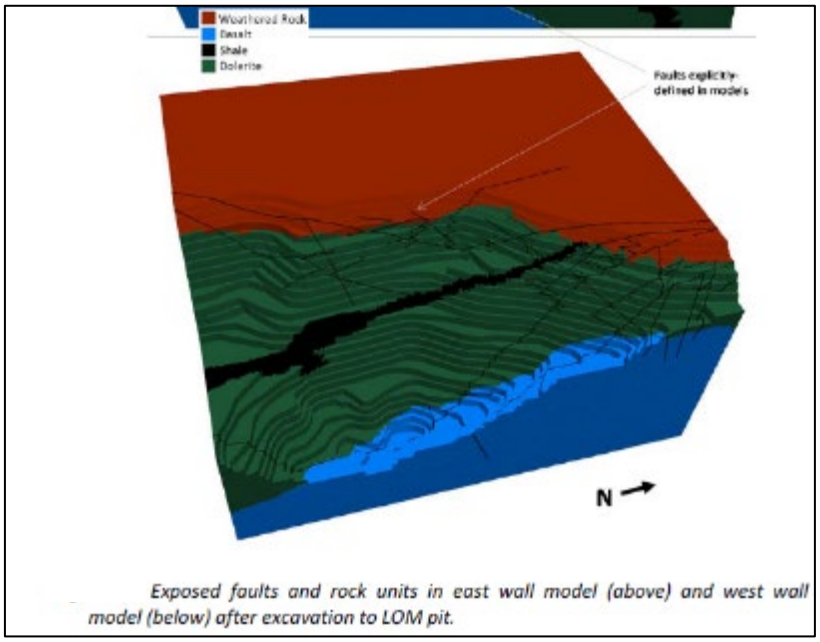


Figure 9-3: Golden Pike Area of LOM western wall showing major structures and lithologies modelled by ITASCA in 2015

In 2020/21 further modelling of the southern sector of the pit wall was undertaken as part of geotechnical studies for the Fimiston South project (Figure 9-4). The southern Fimiston Open Pit wall (Ivanhoe cutback) and eastern wall (Great Boulder, Oroya Brown Hill cutback) have been remodelled for the 2020 Fimiston South Mining Proposal (S45), using the same approach as was done for Western Wall LOM Design (Golden Pike).

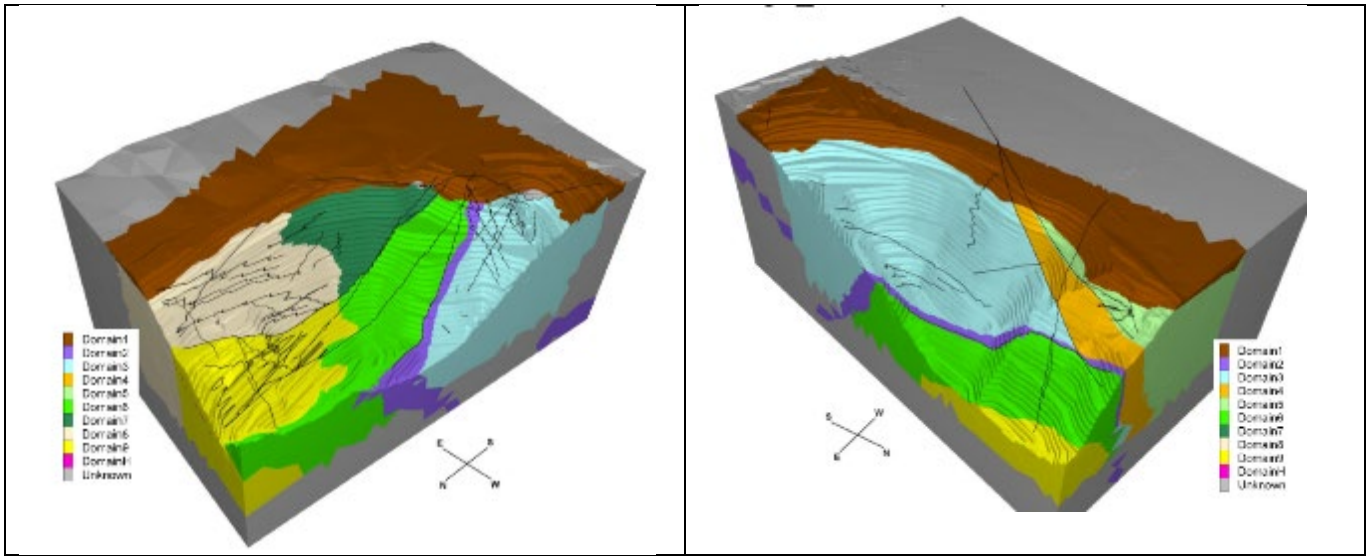


Figure 9-4: Geotechnical modelling of southern Fimiston Open Pit cutbacks by ITASCA in 2021

Open Pit Zone of Instability calculation

The Fimiston Open Pit Zone of Instability was calculated using the current conservative design approach:

- Based on reports previously completed by BFP/Coffey for the Golden Pike approval, the sulphide walls of the pit are taken to be stable. This negates the need to project up from the pit base at 45 degrees;
- The base of oxide (TOFR) where it intersects the pit shell is projected up at 25 degrees;
- The projection is intersected with surface topography;
- The line is simplified to smooth out areas where the line is very jagged;

- The line is further extended horizontally another 10 m, as per DMIRS Guidelines. This line represents the inside edge position of the abandonment structure to the pit.

Final Open Pit Zone of Instability Position

FoS of 1.5 was modelled as part of the geotechnical assessment for the Fimiston South project southern cutbacks and the eastern wall. The results of this modelling were used to adjust the ZOI line (10m offset) to develop a final ZOI line, as shown in Figure 9-8.

The ZOI has been updated for the new pit shell proposed for the Fimiston South project. The methodology used for this work was as follows:

Based on the work conducted by Phil Dwight 2005, analyses showed that the Golden Mile Dolerite (GMD) is a very stable rock mass and that projection at 25 degrees through the oxide is a suitable method to determine the position of the abandonment bund inner toe line.

This method is applicable for a large proportion of west wall where the wall is fully in GMD – see Figure 9-5 . An example of the calculation is provided in Figure 9-6 for the north west wall where the wall is composed of only GMD.

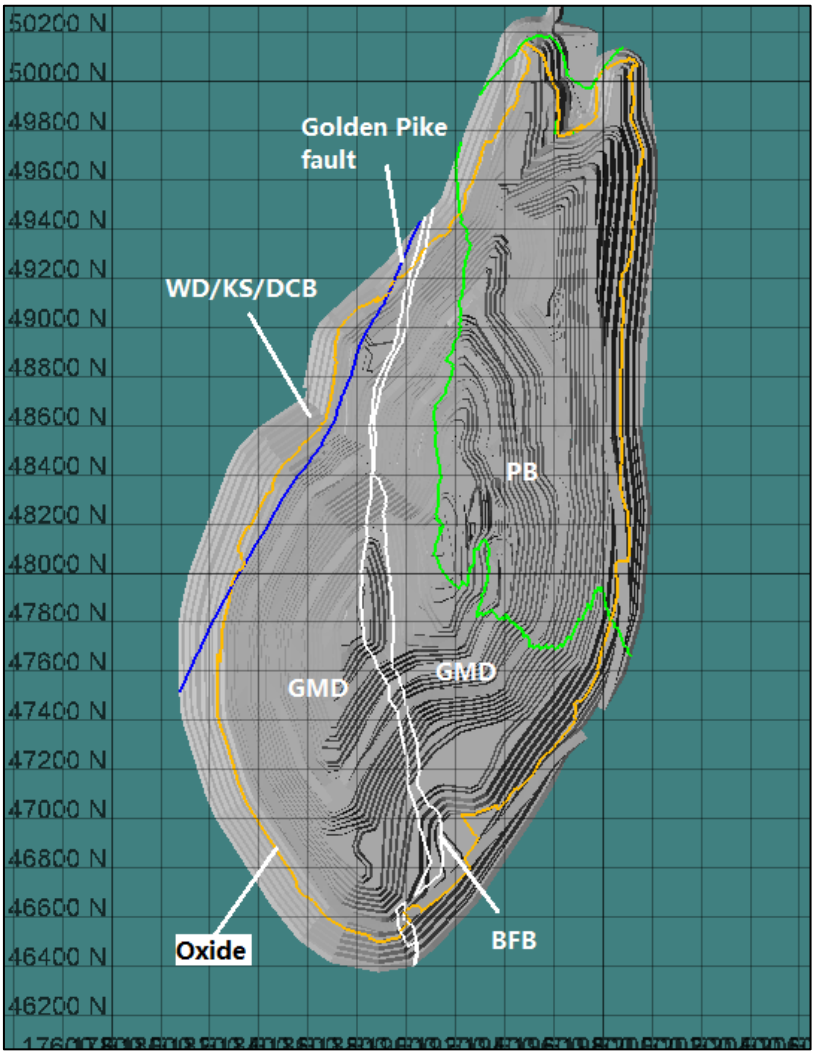


Figure 9-5: Fimiston Open Pit exposed lithologies

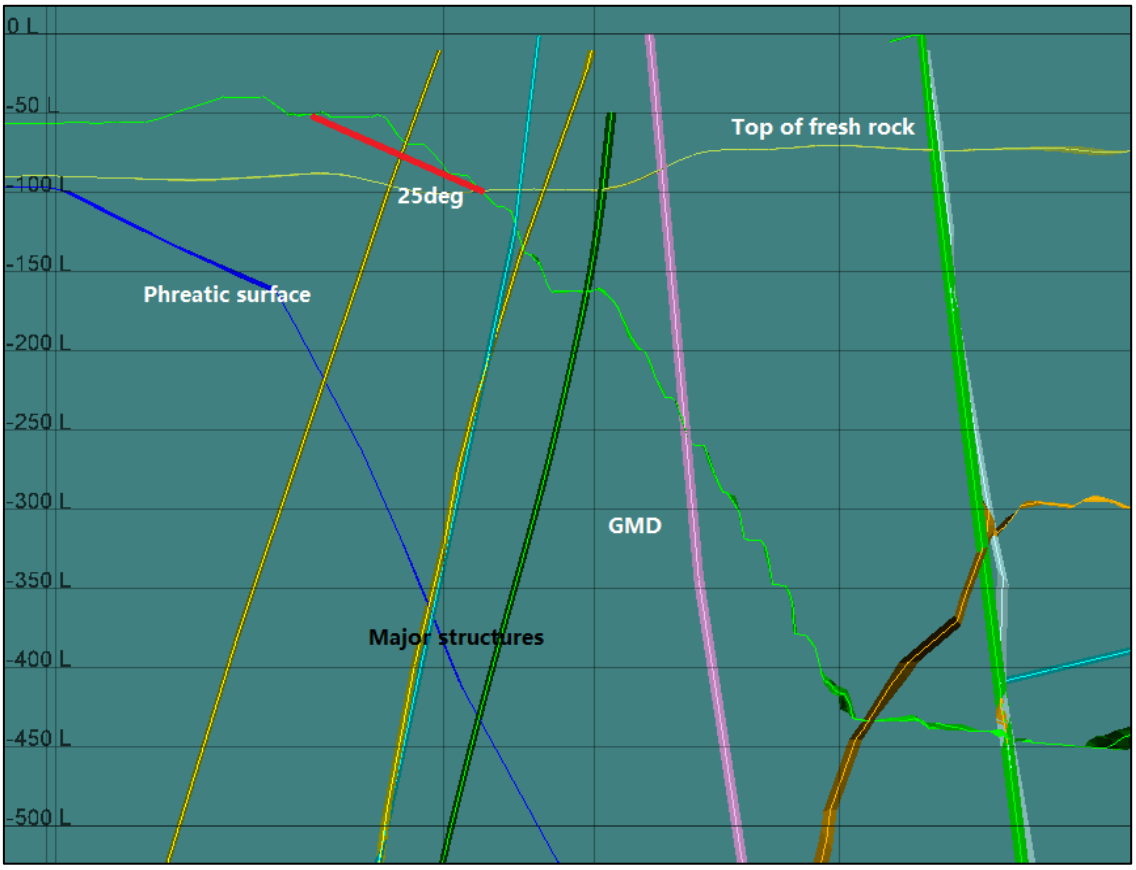


Figure 9-6: Fimiston Open Pit - example of ZOI calculation for the north west wall (GMD)

The Fimiston South project (S38) pit design will result in excavation of a portion of the current Golden Pike west wall, resulting in outcrops of different lithologies (ie not GMD) on the hanging wall side of Golden Pike fault, such as Williamstown Dolerite (WD), Kapai Slate (KS) and Devon Consols Basalt (DCB) (see Figure 9-7). For those lithologies are not as competent as GMD, a 45 degree projection should start from the contact between the weaker lithologies and GMD in the fresh rock (followed by 25deg project in oxide and surface step out). This should result in ZOI extending further towards the west compared to the GMD calculation method.

In areas where weaker lithologies are exposed in the pit walls, the DMIRS default procedure for determining the ZOI was used:

- Project a 45 degree line from the pit bottom in fresh rock slope to the base of oxide
- Continue projecting 25 degrees in oxide up to surface
- Step out 10m on surface

This method is generally applicable for most of the eastern wall exposure, where the lithology is competent Paringa Basalt (PB) and shown in Figure 9-7.

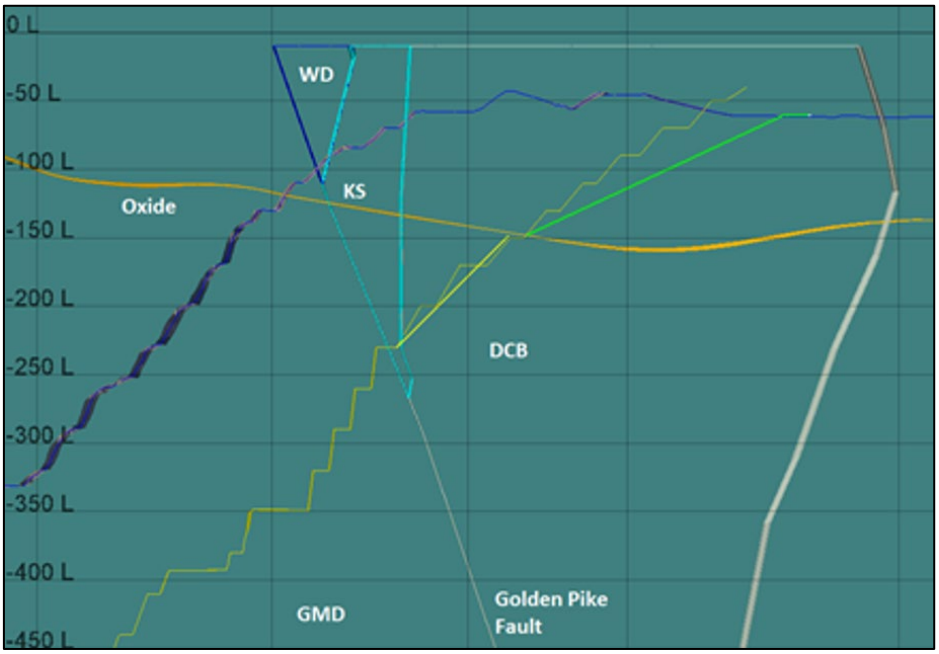


Figure 9-7: Fimiston Open Pit - example of ZOI calculation for west wall were weaker lithologies are exposed

Based on the abovementioned methodology, ZOI is determined based on the S38 pit design and exposed lithology. A plan of the combined ZOI assessments is shown in Figure 9-8.

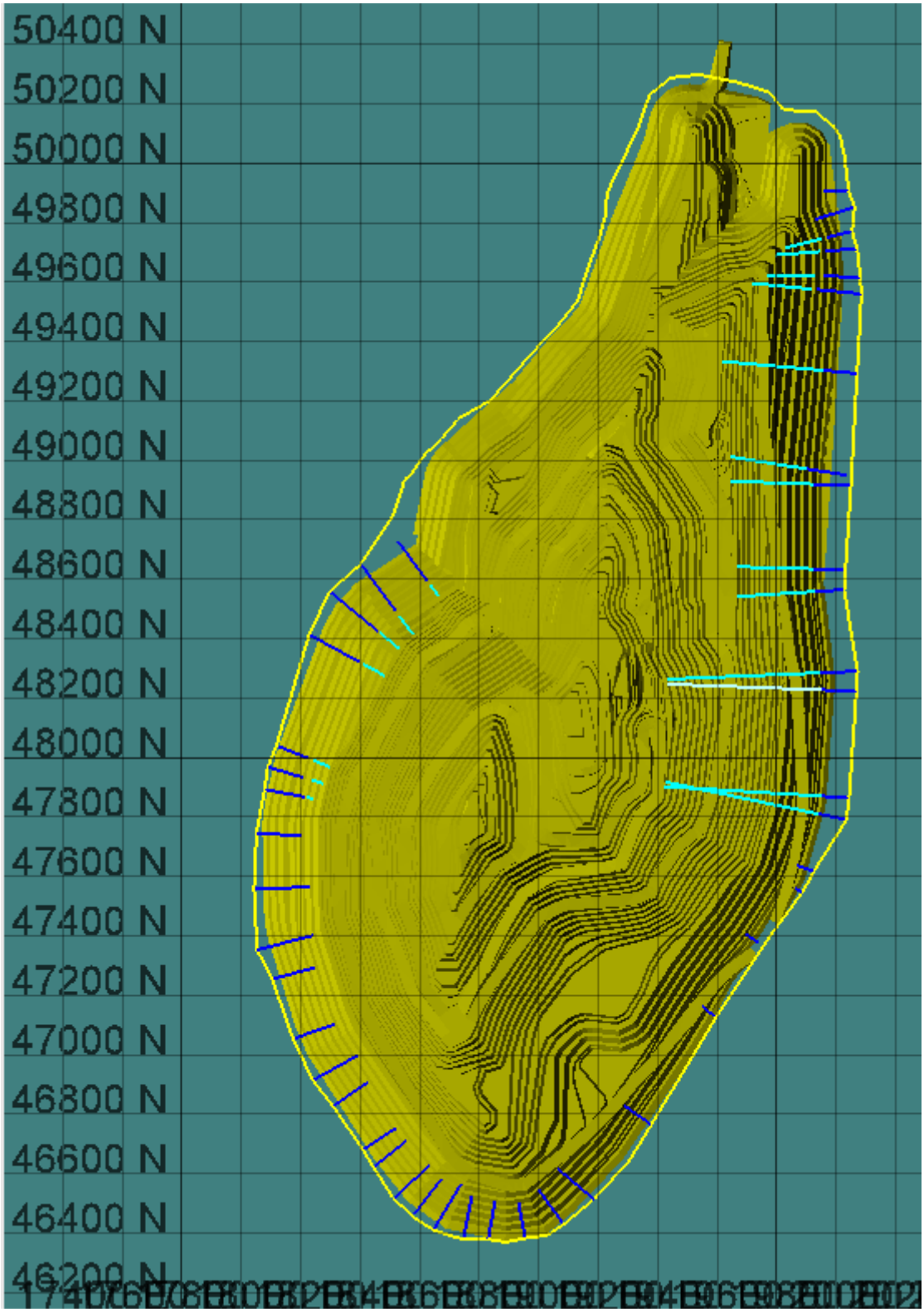


Figure 9-8: Fimiston Open Pit - ZOI, updated for Fimiston South project

(Blue & Teal lines are cross sections to determine the ZOI position)

Operational controls for inadvertent access

The Fimiston Open Pit is currently (during operations) surrounded by a boundary fence with warning signage. The western side is a 6ft diamond mesh fence, which is patrolled daily by security staff. Behind this is located the noise bund, with a rehabilitated outer (western) slope of less than 20 degrees. There is a rehabilitated noise bund between the fence and the pit edge.

Fimiston South project operational controls (2022 update)

A new noise bund (NB) will be constructed of competent rock on the west side of the new Fimiston pit shell for operational noise control. A portion of the noise bund will not be a closure landform, due to it's position in relation to the ZOI.

After construction of the Fimiston South NB, the existing Southern NB will be stripped of topsoil, dug off and become part of the pit footprint. A benefit of this adjustment will be the removal of an underperforming oxide section of the existing noise bund. The Southern NB will be replaced by an operational NB, with a smaller footprint. The operational noise bund will be constructed of competent waste rock with a height of 15m to ensure effective operational noise management.

At closure, the Fimiston South NB will be used as a source of material for construction of the western abandonment bunding. The southern end of the Fimiston South NB will be rehabilitated, the rest will be used for closure purposes.

Closure controls for inadvertent access

For closure, KCGM will place an abandonment feature in the most practically implementable position on the western side of the noise bund, dependent on local spatial constraints (refer to Figure 9-9). The abandonment bund will comply with the DMIRS Abandonment Guidelines dimensions.

On the western side of the Fimiston Operational Area the abandonment feature will be either (dependent on most practical option to implement):

- Option A - a competent hard rock bund with the dimensions of 2 m high and 5 m base located to the west and on the outside of the calculated zone of instability;
- Option B - the equivalent of this rock volume, placed at the toe of the noise bund, to create a rocky band at the base of the noise bund slope to prevent inadvertent access outside of the calculated zone of instability. Option B is particularly relevant in areas with spatial constraints;
- Safety bunds of 0.7 m high will be retained around the perimeter of the pit;
- Appropriate safety signage;
- The fence will be left in place at the end of the post closure monitoring period.

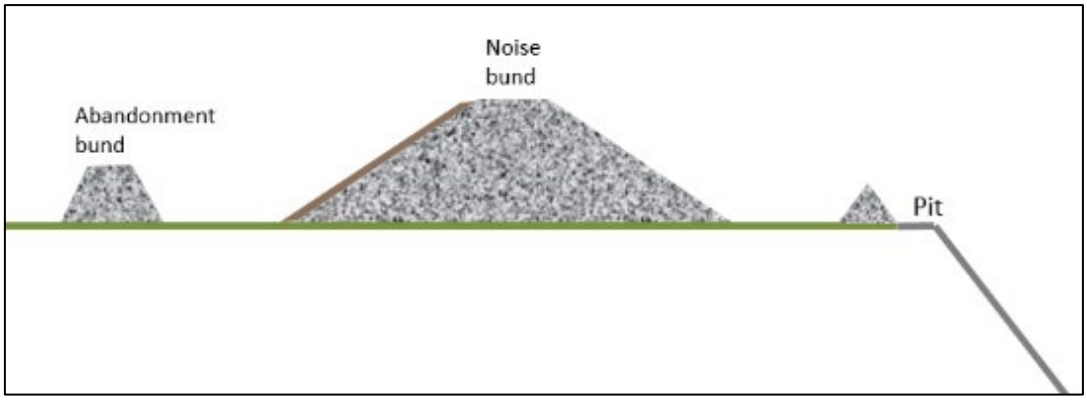


Figure 9-9: Option A: Western abandonment bund located separate from the Noise Bund

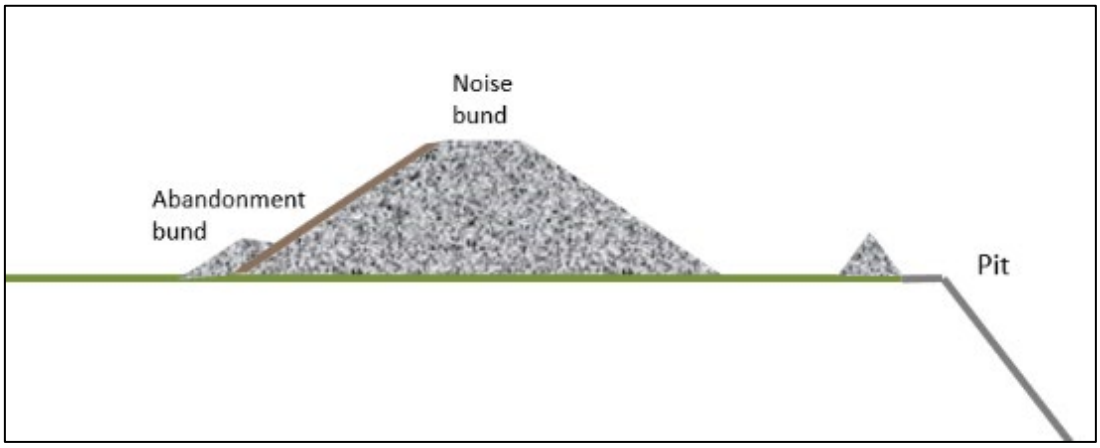


Figure 9-10: Option B: Western abandonment bund located on the toe of the Noise Bund

On the northern, southern, and eastern sides of the Fimiston Operational Area the abandonment feature will be either:

- A competent hard rock bund with the dimensions of 2 m high and 5 m base on the outside of the calculated zone of instability; or
- A competent hard rock bund with the dimensions of 2 m high and 5 m base or equivalent volume placed at the toe of the waste rock dump at a suitable location further out from the pit than the calculated zone of instability. This will allow KCGM to implement establishment of the abandonment bund during operations rather than at the end of operations.
- Safety bunds of 0.7 m high will be retained around the perimeter of the pit;
- Appropriate safety signage;
- The fence will be left in place at the end of the post closure monitoring period.

The abandonment bund location will located outside the Zone of Instability, along the boundary of the Fimiston Open Pit, or in alternative practical locations. The most likely alternative location would be outside of the noise bund on the western side, and on the eastern toe, of the WRDs for the eastern side. This location has the added benefit of being possible to commence progressive rehabilitation works during the operational period. The portion of the abandonment bund located in the Fimiston South noise bund area will not have a noise bund between the abandonment bund and the pit post closure.

Figure 9-11: Most practical location for Fimiston Open Pit final abandonment bund

Planned backfill (S45c)

The last six years of mining (2029-2034), backfill is expected to occur in the northern area of the pit. The backfill will also act as additional (non-essential) buttressing of the northern pit wall.

Backfill will be placed until it reaches natural ground level. The exact volume of backfill will be determined by the operational requirements, but it is currently intended to fill the whole of the area previously referred to as Brown Hill, and currently being mined under the designation OBH North. This will provide further stabilisation of the east wall in an area that has historically suffered from instability, and reduce the potential for erosion in the weathered zone of the pit wall. The potential for the backfill to provide buttressing to the pit walls was not considered as part of the abandonment bund location calculations.

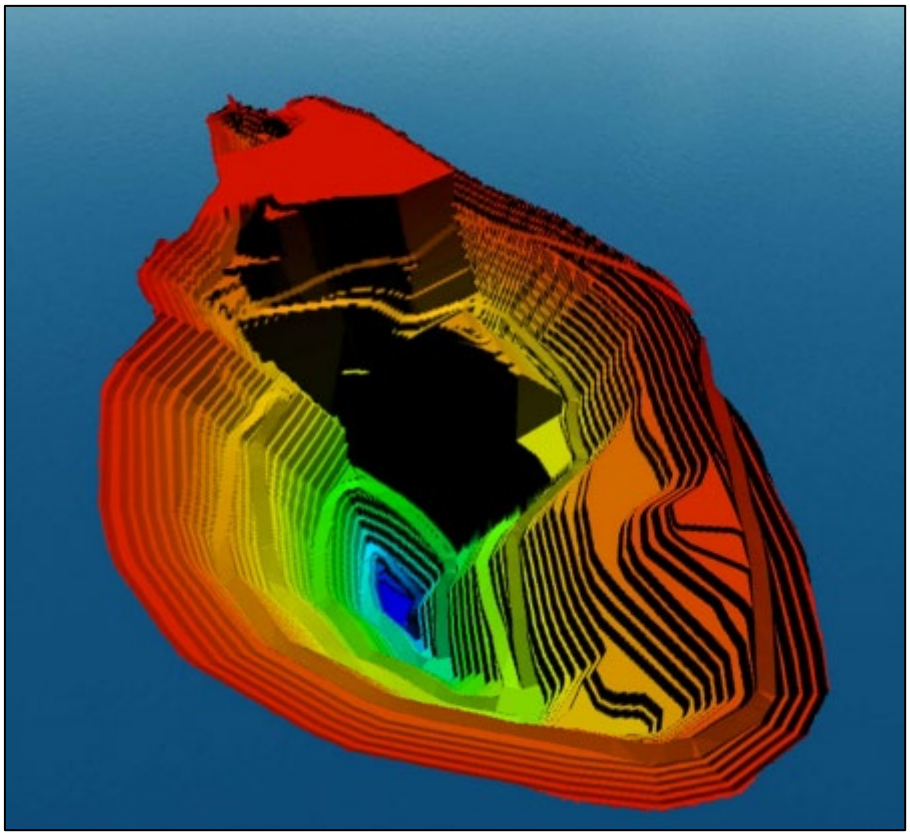


Figure 9-12: Planned backfill in the northern section of Fimiston Open Pit (schematic only)

9.2.2.3.4 Fimiston Pit Lake

Pit Lake Modelling Outcomes

Update of the Fimiston Open Pit pit lake predictive model was undertaken in 2021/22 by Groundwater Resource Management (GRM), groundwater modelling experts, with MWM completing the pit lake chemistry component of the model (MWM & GRM, 2022) – see Volume 3 (Appendix 5-3) for the report.

Key outcomes:

- The water level is predicted to never rise high enough for the lake to discharge from the pit. The maximum volume of the Fimiston pit at completion of mining will be 971GL, with the pit floor at -375 m AHD and pit crest at approximately 350 m. The available volume will be slightly reduced by backfill and buttressing to 853GL.
- The lake level will remain substantially below the original groundwater elevation within the surrounding basement rocks, ensuring the pit will act as a groundwater sink. The predicted pit lake equilibrium elevation is predicted to occur at 470 m to 490 m below the pit crest, and 450 m deeper than pre-mining water levels,

ie the pit lake is a groundwater sink. Equilibrium pit lake water level is expected to occur after approximately 400 years.

- The oxide/ hard rock interface occurs between elevations 280 m and 330 m, ensuring the pit lake level will also remain below the base of oxidation, and in all locations the lake will be in contact with competent bedrock. This oxide interface is at a higher elevation than the inferred pre-mining groundwater levels and significantly higher than the elevation of the equilibrium pit lake.
- Small volumes of groundwater are predicted to decant from the Sam Pearce Decline, located at 316 m, after approximately 100 years. Due to the small volumes, the water is expected to evaporate prior to reaching the pit lake
- Hydrochemical modelling predicts that the final pit lake will be unstratified, hypersaline and circum-neutral. Modelling predicts an initial stratification of the pit lake, with a 20 m deep brackish surface layer for the first 50 years. By 300 years, the stratification will no longer be present, and water quality is predicted to be approximately 150,000 mg/L TDS (similar to local groundwater quality) with a pH of 6.5 – 7.9 (less acidic that local groundwater) due to the acid neutralising capacity of the carbonate minerals on the pit wall and high alkalinity of input waters.
- Water quality will reflect natural trace concentrations of metals associated with the Fimiston ore body, including the presence of Sb, B, Cd, Cu, Mo, Ni and Se. Concentrations of these metals will increase with time due to evapoconcentration, with the exception of Se which is sourced from TSF seepage which will only be pumped to the pit lake for a short period. Total cyanide concentrations are predicted to be less than 0.6 mg/L in the pit lake. Mining is the only identified beneficial user for this saline groundwater system.

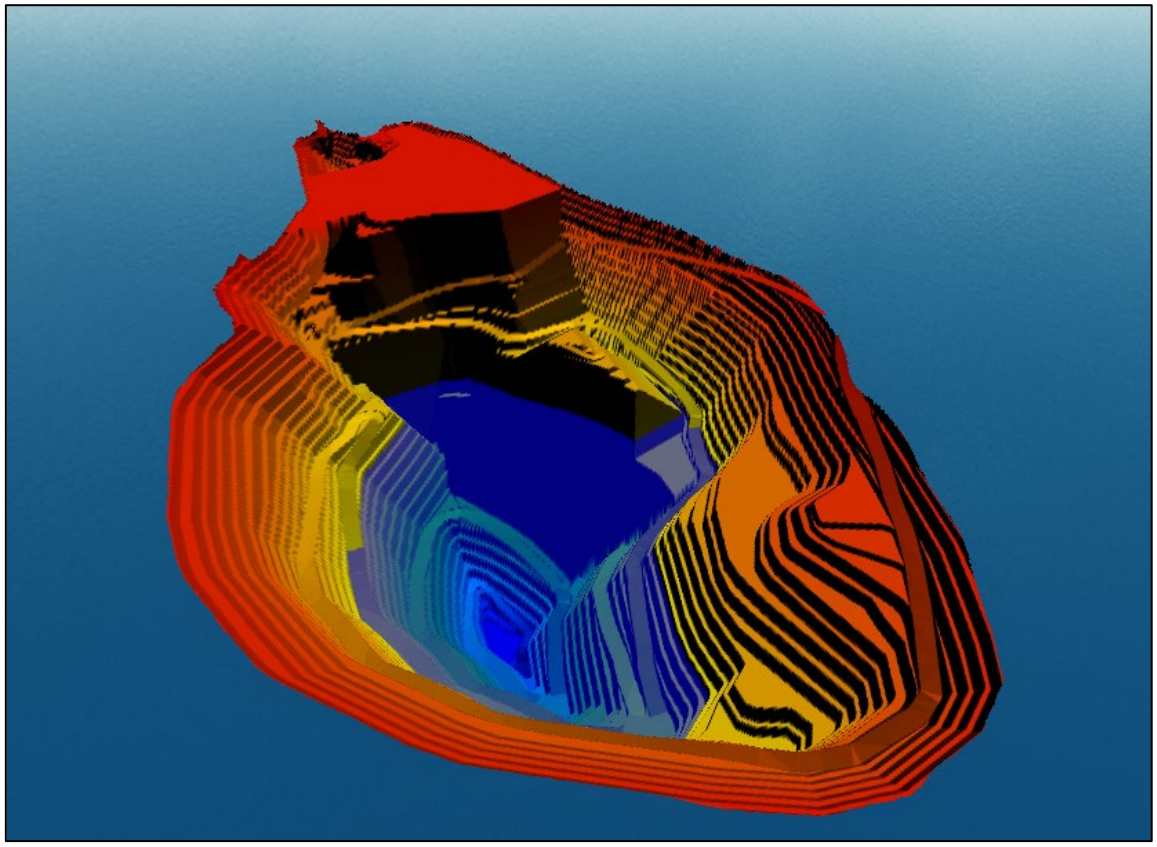


Figure 9-13: 3D visual of the final Fimiston pit and the pit lake

Modelling indicated that 75% of the pit lake filling occurs within the first 50 years, after which the rate of fill slows.

Initially the TSF seepage groundwater will be the largest contributor to the pit lake, with seepage collection expected to occur for 10-15 years after processing ceases. Over time, the contribution of local (to Fimiston pit) fractured rock groundwater and pit wall runoff will increase.

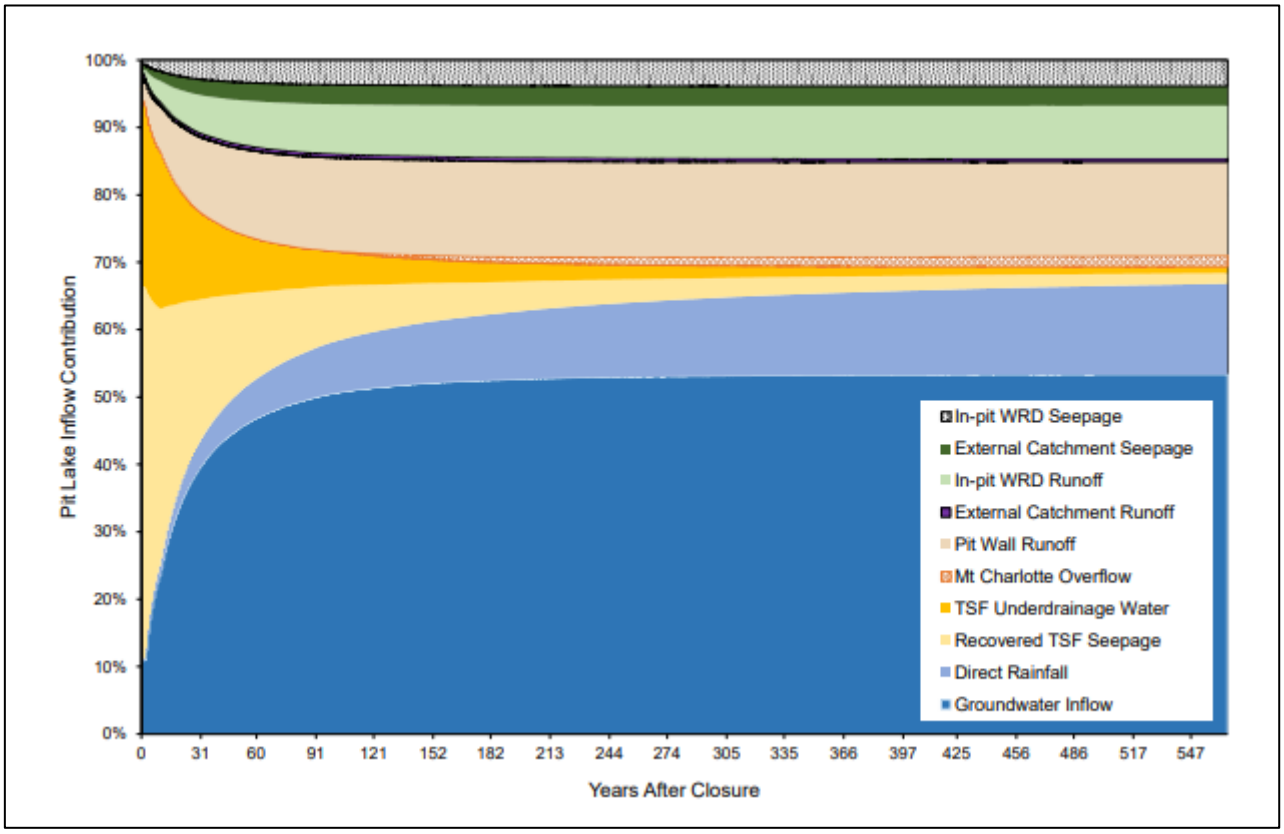


Figure 9-14: Pit lake water contributions over time

The chemistry will be dominated by sodium, chloride and sulfate. Marginally elevated concentrations of potentially environmentally significant dissolved metals and metalloids are predicted to occur for antimony, boron, cadmium, copper, molybdenum, nickel and selenium. Except for selenium (originating from TSF seepage input water), evapo-concentration of these metals will occur over time.

Access to the pit lake by terrestrial fauna is unlikely due to substantial distance from ground surface; the water is likely to be unpalatable to flying fauna and thus not expected to represent a significant risk.

9.2.2.3.5 Closure Implementation Status

***Completed* Closure Tasks and Studies**

Table 9-6: Completed Tasks and Studies for Fimiston Open Pit and Sam Pearce Decline

FEATURE	STATUS	WORK COMPLETED UP TO 2022
Fimiston Open Pit	Operational	Open Pit Abandonment Strategy Project: • Pit lake model was redone for the new Fimiston South pit shell; outcomes have been incorporated into the MCP2022. • The pit abandonment line was redeveloped for the new Fimiston South pit shell; outcomes have been incorporated into the MCP2022.
Sam Pearce Decline	Operational	• Not applicable at this point in LOM

Planned Closure Tasks and Studies Work Program

Table 9-7: Planned Closure Tasks for Fimiston Open Pit and Sam Pearce Decline

PLANNED TASK / STUDY	APPROACH
Review Pit lake model and potential groundwater discharge to pit	Rerun pit lake model is closer towards end of LOM or when significant changes in LOM are identified which would have a material impact on the pit lake
Develop Open Pit Abandonment Strategy	Open Pit Abandonment Strategy has been updated to reflect the Fimiston South cutbacks; Verification geotechnical modelling is planned to verify the zone of instability, this will take several years, as reflected in the updated Schedule of this MCP (Golden Pike cutback area)
Pit wall stability monitoring	After cessation of pit operations for five years
Preparation of Final Pit Wall Stability Review	At appropriate point after cessation of pit operations and monitoring, a final geotechnical close out review will be conducted.
Confirm final location of abandonment bund for western side of the Fimiston Open Pit	Final discussions with stakeholders – Main Roads, Shire, Electrical companies - with respect to position of abandonment bund in relation to public infrastructure in the vicinity of Burt Street turn off (when ZOI is closest to infrastructure); determine agreed way forward, including timing and funding.
RIWA Licencing for disposal of groundwater in Fimiston Open Pit	Prior end of LOM, submit appropriate application to obtain licence

Planned Closure Rehabilitation Activities

For the timing of Rehabilitation Activities, please refer to the consolidated Schedule of Activities in Section 9.6.2.6

Table 9-8: Planned Rehabilitation Activities – progressive and at closure

DOMAIN	FEATURE	APPROACH
Mining Infrastructure	Fimiston Open Pit and Sam Pearce Decline	• Construction of abandonment bunding around Fimiston Open Pit; • Maintain perimeter fence until end of monitoring period (with safety signage); • Paddock dump waste on upper pit access ramps to prevent vehicle access, retaining limited emergency access; and • Decommission and salvage equipment from Fimiston Open Pit water transfer infrastructure and dewatering bores.

9.2.2.3.6 Information Gaps

Further geotechnical verification work is planned for this Domain, in particular to verify previous work for the Golden Pike western wall area prior to closure.

9.2.2.4 Key Tasks for Premature Closure

An overarching strategy for Premature Closure of Fimiston Operational Area is described in 9.1.3.

For premature closure, this Domain would move into Care and Maintenance, with the intention to restart operations. Should this not eventuate, closure works described in Section 9.2.2 would be implemented.

9.2.2.5 Fimiston Mining Fuel Farm and Mining Maintenance

9.2.2.5.1 Description of Area

The location of the features of this domain are shown in Figure 9-1 and timing of closure and disturbance area are provided in Table 9-3.

9.2.2.5.2 Closure Strategy

Closure for this Domain largely pertains to removal of buildings and infrastructure and investigation of potential contamination. Rehabilitation of laydown areas, offices, mining workshops and crushing facilities are described in Table 9-2.

Safe – Demolition and demobilisation of Buildings and Infrastructure

It is anticipated that all structures will be removed or buried in this domain by the end of closure works. If available, rehabilitation materials will be used to complete the closure works. Due to the shortage of topsoil, no topsoil has been scheduled for the Fimiston Mining Infrastructure Domain.

All structures and buildings will be safety decommissioned and demolished or removed from site, with concrete footings broken up and removed or buried *in situ*. The area will then be ripped to promote infiltration of rainfall and seeded with salt tolerant species.

Non polluting – Contamination

The non-polluting completion criteria are applicable to the Mining Maintenance area and fuel farm where hydrocarbon spillage is likely to have occurred, appropriate clean up in compliance with Contaminated Sites Act will be required in these areas. The fuel farm areas is inward draining, with stormwater reporting to the Fimiston Open Pit. The Mining Maintenance area drains to the east towards the Eastern Floodway.

It is anticipated that volumes of fuel and hydrocarbons will be run down towards the end of active use of these facilities. Once refuelling and equipment maintenance activities are no longer required, these areas will be investigated as per Contaminated Sites requirements with specific rehabilitation methods implemented based on investigation outcomes.

Sustainable Land Use - Rehabilitation

The area will be ripped and seeded. If there are left over rehabilitation resources, they will be used for this area.

Rehabilitation Materials for Mining Infrastructure Domain

Due to the shortage of rehabilitation materials at Fimiston, topsoil resources have not been allocated to these areas. Local topsoil, subsoil or oxide will be used where available.

9.2.2.5.3 Closure Implementation Status

Completed Closure Tasks and Studies

Table 9-9: Completed Tasks and Studies for Fimiston Mining Fuel Farm and Maintenance

FEATURE	STATUS	WORK COMPLETED UP TO 2022
Fimiston Mining Fuel Farm	Operational	• Contaminated Sites risk ranking process completed; • Further studies not applicable at this point in LOM; • Ongoing operational management of hydrocarbons and other materials of concern through operational management systems
Fimiston Mining Maintenance	Operational	• Contaminated Sites risk ranking process completed; • Further studies not applicable at this point in LOM; • Ongoing management of hydrocarbons and other materials of concern through operational management systems

Planned Closure Tasks & Studies

For the timing of Rehabilitation Activities, please refer to the consolidated Schedule of Activities in Section 9.7.

Table 9-10: Planned Closure Tasks and Studies for Mining Maintenance

TASK	TARGET COMPLETION DATE/PERIOD
Demolition Planning	Conceptual level complete
Operational clean up procedures to minimise contamination; Opportunistic sampling	Ongoing, opportunistic
Contaminated Sites investigation	After operations have ended

Planned Closure Rehabilitation Activities

Rehabilitation activities will only be implemented at the end of operations.

Table 9-11: Planned Closure Rehabilitation Activities for Mining Maintenance

FEATURE	ACTIONS
Fimiston Mining Fuel Farm	• Dismantle/demolish all structures to below ground level unless specified otherwise; • Contaminated Sites investigation • Capping and rehabilitation
Fimiston Mining Maintenance	• Dismantle/demolish all structures to below ground level unless specified otherwise; • Contaminated Sites investigation • Capping and rehabilitation
Crushing Facilities	• Dismantle/demolish all structures to below ground level unless specified otherwise; • Cross rip and seed with native species if the area is identified for revegetation;

9.2.2.6 Information Gaps for Mining Infrastructure Domain

The broad requirements of this area are well understood.

Contamination investigation will be conducted after demolition.

9.2.2.7 Key Tasks for Premature Closure

An overarching strategy for Premature Closure of Fimiston Operational Area is described in 9.1.3.

For premature closure, this Domain would move into Care and Maintenance, with the intention to restart operations. Should this not eventuate, closure works described in Section 9.2.2 would be implemented. During this interim period, hydrocarbon management would be required, including the cleaning out of sumps and management or removal of hydrocarbon or other chemicals of concern.

9.2.3 Fimiston Waste Rock Dump Domain

9.2.3.1 Description of Domain

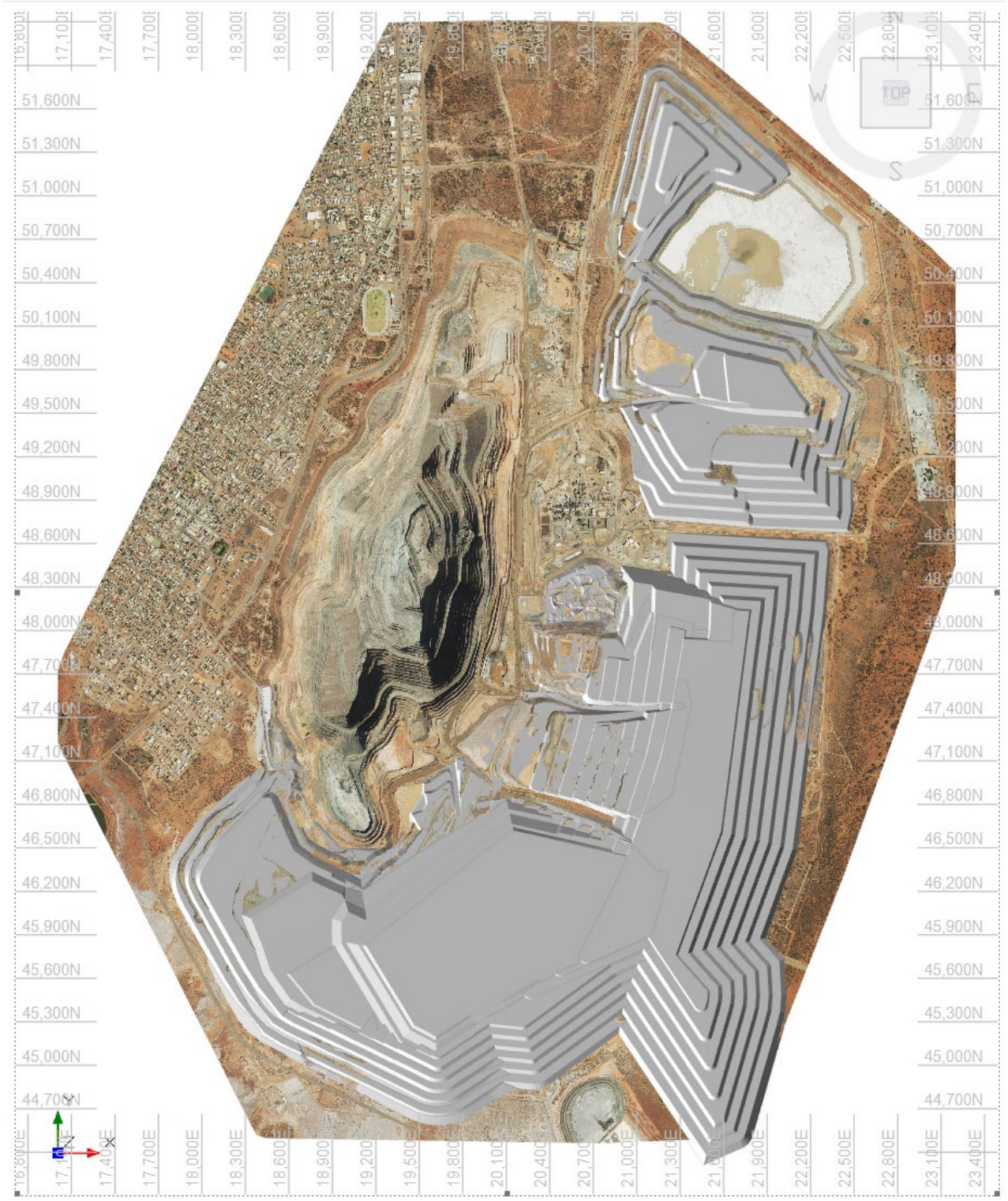


Figure 9-15: Fimiston Waste Rock Dumps Final Design (mine site grid)

The Fimiston WRD domain will remain active operational areas until 2034 (BP2023 LOM). Thereafter, stockpile areas are likely to remain operational until processing ceases at the Fimiston Mineral Processing Plant. The estimated final closure time frames are shown in Table 9-12, with approximately 6-12 months required thereafter to complete rehabilitation of the WRDs. All WRDs are currently active. Areas that are at final design have been progressively rehabilitated.

Table 9-12: Fimiston WRD Domain Disturbance (2020 MRF) and Estimated closure dates

FIMISTON WRD	STAGE OF REHABILITATION	PROPOSED/ APPROVED FOOTPRINT	DISTURBED LAND (HA) MRF 2021	LAND UNDER REHABILITATION (HA) MRF 2021	TOTAL
Trafalgar	Operational until 2034	598	421	166	**587**
Trafalgar - Far Eastern	Operational until 2034	140			
Oroya	Operational until 2034	426	225	122	**347**
Environmental Noise Bund (incl Southern NB)	Operational until 2034	125	0	74	**74**
Fimiston South Noise Bund	Operational until 2034	9			
North Eastern	Operational until 2034	323	217	32	**249**
Northern	Operational until 2034	102	53	33	**86**
Total			748	427	**1175**

The new WRD final designs allow for the increased capacity requirements of the proposed cutbacks (recent S45c and S38 approvals), as shown in Figure 9-15. The WRD will require additional CASA controls such as lighting.

9.2.3.2 Applicable Land Use Outcomes

9.2.3.2.1 Post Mining Land Use and Closure Criteria

The applicable land use outcomes are provided in Table 9-2, with modified landscape the final land use for this Domain. Relevant Closure Completion Criteria are provided in Table 9-13.

Table 9-13: Completion Criteria for Fimiston WRDs

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe	Inadvertent access is restricted as much as practicable to any landforms or structures that are considered unsafe.	Removal or burial of all mine structures/buildings/foundations and machinery by suitable demolition / civil company unless legal liability accepted by post mining land owner. Transfer of ownership including legal documentation agreed to within reasonable timeframe (2 years), with legal documentation completed at time of closure implementation.	Transferred assets	The post closure retention of any mine infrastructure requires agreement from relevant Stakeholders and legal documentation of ownership transfer.	Transfer of ownership legal documentation included in Final Relinquishment Report.
		Limit ability of vehicular traffic to travel over crests through construction of adequately sized and positioned crest bunds on all possibly unsafe mine structures identified through area specific assessment. Incorporation of requirement into closure designs and planning. Fauna egress considered in design.	Mine waste landforms/ excavations	Crest / safety bunds constructed on any remaining excavation/ trench/channel/pit/embankment/ landform with slopes exceeding 25 degrees or depth exceeding 0.5 m.	Confirmation of construction of safety measures through visual inspection and/or aerial images.
			Mine waste landforms	Any (older) mine waste landforms located or partially located within long term mine pit instability zone to have competent abandonment bund/s designed and implemented based on area specific assessment to restrict vehicle access to safe area of landform.	Certification of compliance based on aerial photography / DTM and site inspection by suitable professional recorded in Final Relinquishment Report.
		Landforms compliant with CASA requirements.	Fimiston mine waste landforms	All mine waste landforms and remaining structures to be compliant with Kalgoorlie-Boulder Airport height restrictions or other CASA requirements.	Confirmation through as-constructed DTMs of height of mine waste landforms.
Geo-Physically Stable	Mine landforms achieves long term geotechnical stability.	Implementation of site appropriate geotechnically stable designs for mine waste landforms. Final batter slope angle selection dependent on landform	WRDs	Mine waste rock dumps and TSFs have slopes of <20 degrees (excluding buttressed areas).	Assessment at end of operations to ensure slopes are battered down and stable through site inspections or DTMs, recorded in MCP or associated closeout report.

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Geo-Physically Stable		materials properties and cover material properties.			
	Long term erosion stability and integrity of engineered mine landform covers based geomorphological processes observed within the local region.	Effective landform surface drainage control measures based on landform water retaining designs.	WRDs	Appropriately implemented surface water management structures on TSFs as per ANCOLD 2019 Guidelines. Rehabilitation implementation meets design intent with appropriately implemented surface water management structures on WRDs i.e. erosion resistant design has water catchment on benches and water retaining design slope cover.	Design and implementation verified by suitably qualified engineer and recorded in MCP or associated close out documents.
		Landform cover designs based on scientific modelling (300 yr time frame) or site specific trials/monitoring performance under expected regional climatic conditions. Rehabilitation Performance Assessment of trial plots and implementation of findings in final cover designs.	WRDs	Rates of erosion of landform covers are within an acceptable range taking into account regional climatic conditions and material characteristics and do not impact on the geotechnical integrity of the landform. No visual evidence of active gully erosion exposing underlying dispersive and/or unstable material.	Site inspection report and whole of landform aerial photographic analysis by suitably qualified professional.
		Where possible restrict, access to rehabilitated mine waste landforms by human traffic and domestic livestock grazing to minimise potential for damage to constructed covers.	Mine waste landforms,	Where required and practicable, access to rehabilitated landforms is to be limited through the use of fences or rock bunds.	Site inspection records (including photographs and GIS mapping) to verify installation of fences to limit access recorded in MCP or associated close out documents.
Non Polluting	The landforms containing materials of concern will be managed to minimise impacts to the quality of the surrounding environment.	Materials with potential (long lag) to generate AMD are placed in a demarcated area and have an appropriate closure capping design to minimise risk of AMD.	Ore stockpile – Black Flag shale	High Grade Black Flag stored within dedicated stockpile area with encapsulation closure design.	Record of high grade BF ore stockpile capping design and implementation in MCP or associated close out documents. Record of Gidji design implementation in MCP or associated close out documents.

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
		Minimisation of sediment movement from the immediate footprint of mine landforms through use of effective covers, drainage control and toe sediment retention bunds.	Mine waste landforms (WRDs)	Mine waste landforms do not actively discharge alluvial fans into adjacent natural drainage lines (creeks). No discharge of sediment or contaminants of concern beyond the assimilative capacity of the local environment based on Australian Standards.	Aerial photography verification of no active alluvial fans extending beyond the immediate foot print of mine waste landforms. Action if identified. Relevant post closure groundwater and surface runoff monitoring data.
Sustainable Land Use	Rehabilitate disturbed areas to a modified landscape receptive to vegetation regrowth and recovery over time considering visual amenity and properties of available rehabilitation materials.	Vegetation attributes in rehabilitated areas to have values indicative of the target post mining land use. Salinity and other constraints on vegetation growth are acknowledged in monitoring and assessment of completed rehabilitation. These data are used to underpin the vegetation attributes criteria and understanding the performance of rehabilitation across site.	Fimiston	Fimiston operational area revegetation has values indicative of the agreed post mining land use, modified landscape, accounting for placement of rehabilitation material types (implementation of the Visual Amenity Strategy).	Rehabilitation performance monitoring using accepted vegetation monitoring techniques and measures. Includes assessment against targets values, and demonstration of the ability to become self-sustaining (as detailed in Section 10).
		Weed control on landforms during closure and rehabilitation performance monitoring period.	All areas	Management of Declared Weeds or Weeds of National Significance on landforms.	Rehabilitation performance monitoring includes identification of Declared and National Significance weeds.

9.2.3.3 Closure Strategy

Large WRDs exist at the Fimiston Operational Area. Due to operational/closure opportunities, there was a focus on refining WRD closure planning for Fimiston between 2012 and 2015. A strategy for the closure implementation for the Fimiston WRDs was developed taking the following into consideration:

- Alignment of mining/mine planning and environmental requirements;
- Development of final closure waste dump designs, specifications and standards considering practical operational limitations;
- Optimisation of costs and prevention of rework;
- Alignment with regulatory requirements and community expectations;
- Visual amenity to residential areas should be used to assign rehabilitation materials;
- Requirement for encapsulation of High Grade BF Shales; and
- CASA / City of Kalgoorlie Boulder Airport requirements.

An internal WRD design sign off and assessment process at closure, mining/mine planning and geotechnical assessment process exists at KCGM. Closure rehabilitation designs were completed, after detailed design work, including erosion studies, which were used to develop operational tip-to designs. The WRDs presented in previous MCPs have been through this sign off process. WRD designs are discussed in detail in 9.2.3.4.

Safe – Removal of Buildings and Infrastructure or Transfer of Assets

Transfer of Assets / Airport requirements

Due to the proximity of the Fimiston Operational Area to the City of Kalgoorlie-Boulder airport, there are CASA requirements for landforms. These are actively managed during operations, with liaison between KCGM, the CKB Airport and CASA. KCGM conducts 6-monthly audits of compliance to CKB Airport / CASA requirements.

At closure, aviation requirements ie obstacle lighting, will need to be maintained at Radio Hill (Oroya WRD) and on the new upper section of Trafalgar WRD (Fimiston South MP). Agreement will need to be reached with the CKB Airport for ongoing maintenance of this equipment after the closure monitoring period.

Visitors Lookout

Due to the Fimiston Open Pit's size and proximity to the City of Kalgoorlie-Boulder, the visitor's lookout is a popular tourist attraction while there is activity in the pit. Regulatory requirements for public safety have precluded the ability of KCGM to leave a tourism lookout in place post closure. The lookout is currently located at the south west corner of the pit, however will relocate to midway up the western side of the Fimiston Open Pit until end of mining operations. The lookout will be closed at the end of post closure geotechnical monitoring (approximately 2039).

Safe – Landforms within the Zone of Instability

No Fimiston WRD have been designed within the Zone of Instability, as shown in Figure 9-11. If the operational noise bund should fall within the calculated zone of instability, the abandonment bund position will be outside and to the west of the calculated Zone of Instability line.

Geophysical – Long term geotechnical stability of landforms

During the design process, a geotechnical assessment of the WRD design is undertaken, and corrections are made. In general, the erosion criteria for KCGM WRDs are more stringent than the geotechnical design criteria.

Geophysical – Long term Erosion Stability

A substantial body of work has been undertaken to ensure Fimiston WRDs are designed and implemented in an erosionally stable manner. Further information is provided in Section 7.4.3, Vol 1 and in the following Section 9.2.3.4.

Non polluting – Management of Black Flag Shales waste and ore

Fimiston waste characterisation studies have shown that the majority of the waste rock is non acid forming (NAF) and has substantial acid neutralising capacity (ANC). Black Flag Shales (BF Shales) form 3.1% of the total waste volume at Fimiston. Of this 3.1%, less than 50% is mineralised BF Shales, which have the potential to be PAF, if

left fully exposed. Inherent sulfide oxidation rates are very slow, with a significant lag period. This material is considered a resource, and is stored in a stand-alone ore stockpile. The closure design for this stockpile is a water shedding cap. A minimum of 2 m of truck compacted oxide material, domed, will form a capping layer over the BF ore stockpile located on Central (NE) WRD. This will then have a rock capping to prevent erosion of the oxide cap.

NAF waste BF Shale material is conservatively managed by co-disposal with dolerite and basalt waste, which has acid neutralising potential. Current precautionary operational procedures include no waste Black Flag material dumping within 50 m of an outer face or within 5 m of a final height of a WRD.

Non polluting – sediment discharge

Fimiston WRD design is focused on erosion resistance, which implies that sediment from the WRD will be minimal after the initial 'settling' period. In addition, the planned abandonment bund will act as a sediment retention structure, should sediment be excessive (this is not anticipated to be the case).

Sustainable Land Use – Rehabilitation

Fimiston WRD are rehabilitated progressively, using limited growth media resources as effectively as possible by implementing the Visual Amenity Concept.

Visual Amenity concept

Visual Amenity of the Fimiston Operational Area is outlined in Volume 1 within Section 5.3.2.2 (Vol 1) as a strategy to achieve satisfactory rehabilitation outcomes with limited rehabilitation material resources. The concept involves using the best materials on landforms facing the City of Kalgoorlie-Boulder. For the Fimiston WRD, in practice, this means lower quality materials (or no materials) would be used on the eastern "back slopes" and areas not visible or less visible to the public. The concept acknowledges that quantities of rehabilitation materials available for Fimiston are a finite resource and their usage needs to be optimised. Previously approved MCPs and Mining Proposal RegID 69903 acknowledge this strategy. Refer to section 9.2.3.5.1.

9.2.3.4 Detailed WRD Design

A simplified representation of the Erosion Resistant design is shown in Figure 9-16, and includes:

- a high percentage rock mixed into the batter surface;
- robust crest bunds;
- backsloping berms;
- water control on upper surfaces, if required; and
- soil water holding capacity considerations.

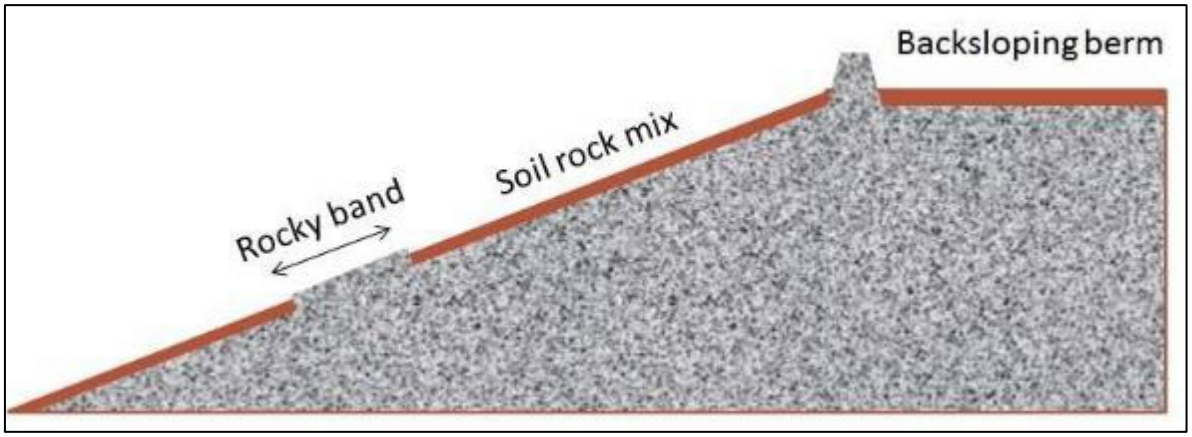


Figure 9-16: Closure Waste Dump Batter Design

In 2014, the implementation of this design was trialled on the Northern WRD to assess constructability and practicality of the proposed design, and to test earthmoving techniques in order to establish the most cost effective means of implementation. This trial was considered successful.

Figure 9-17: Northern WRD after Ripping

A key component of the proposed new Erosion Resistant rehabilitation design is the implementation of the Visual Amenity Concept and the use of erosion management strategies such as the addition of rocky bands and utilising a high percentage rock cover (assessed after rainfall has settled the soil. It is KCGM's intention to use this proposed new rehabilitation design (and area specific variations of this design) for all new rehabilitation areas on Fimiston WRDs. This will enable consolidation of an approved rehabilitation design into a single cohesive plan. The Mining Proposal (RegID 69903, approved 2017 and RegID 994415, approved 2021), for all Fimiston WRD, includes the Visual Amenity Concept, and clearly defines areas where the newer Erosion Resistant design will be implemented, and where older designs have already been implemented. Due to the new WRD design, almost all areas will now be finished to the new (erosion resistant) design. Table 9-14 provides implementation details for each of these designs.

Cross sections of the WRD profiles shown in Figure 9-18 to Figure 9-22.

Table 9-14: Summary of LOM WRD Closure Designs

DESIGN CRITERIA	LOM WRD DESIGN FOR EROSION RESISTANT DESIGN			
	Northern	North Eastern & Oroya	Trafalgar	All Fimiston WRDs
Height / lifts	4 lifts 20 m high lifts Nominally 80 m high	Up to 7 lifts (depending on ground elevation) Nominally 20 m high lifts.	20m high on the first lift on the Western side, stepping up to a final height of 140m on the eastern side (7 lifts)	Nominally 20 m lifts (variations due to changes in ground surface elevation)
Slopes	Nominally 16-20°			
Bench/Berm Width	Nominally 10 m wide			
Water Management	Robust crest bunds, constructed of waste rock, nominally 0.75 m high or reasonable alternative. Backsloping benches.			
Rehabilitation Method	High percentage rock cover on slopes. Rehabilitation Materials applied as per the Visual Amenity Concept, usually at 200 mm depth. Some areas may not receive any rehabilitation materials, in particular the eastern side, due to insufficient resources.			

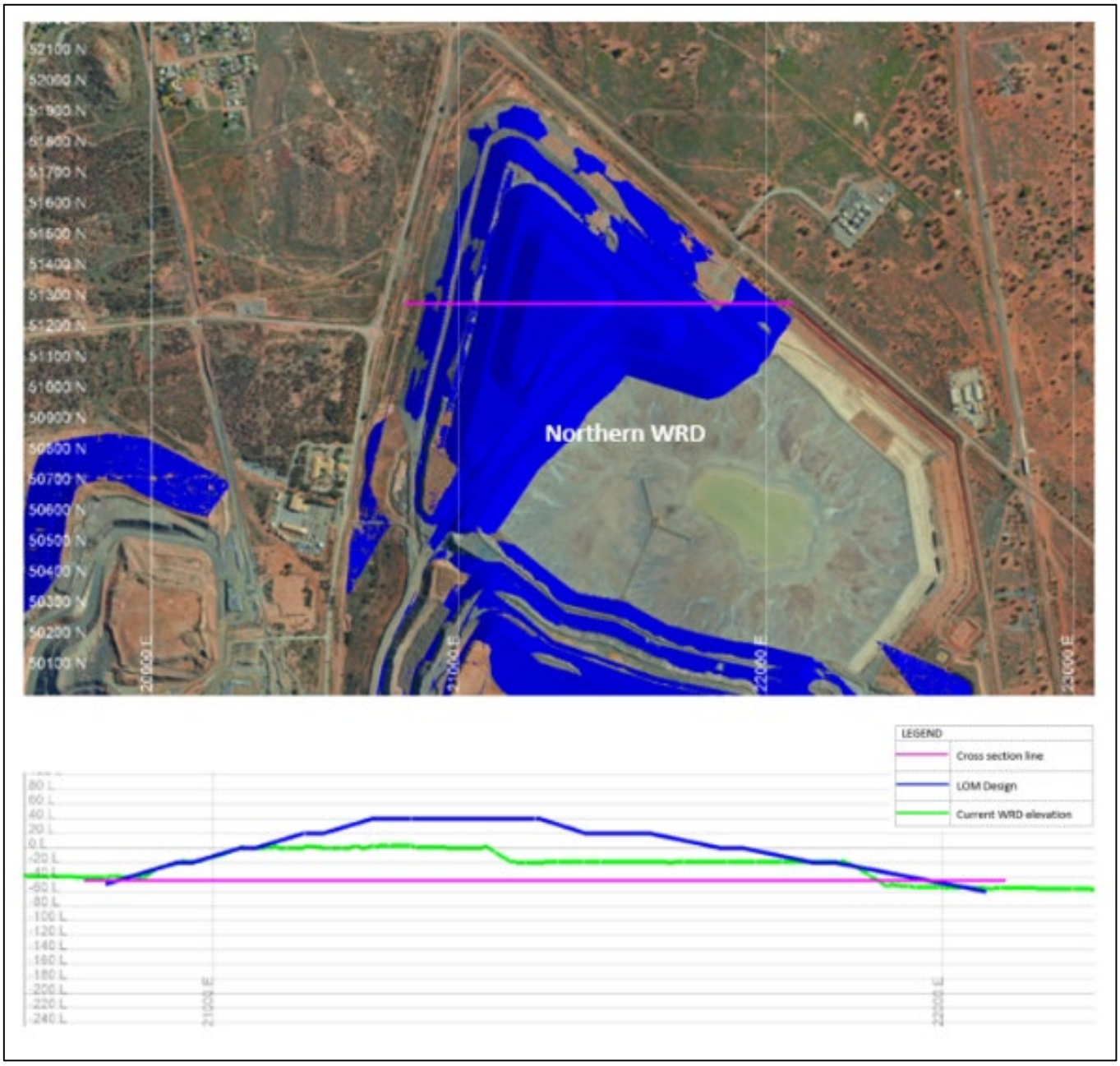


Figure 9-18: Fimiston Northern WRD Closure Design and Cross Section

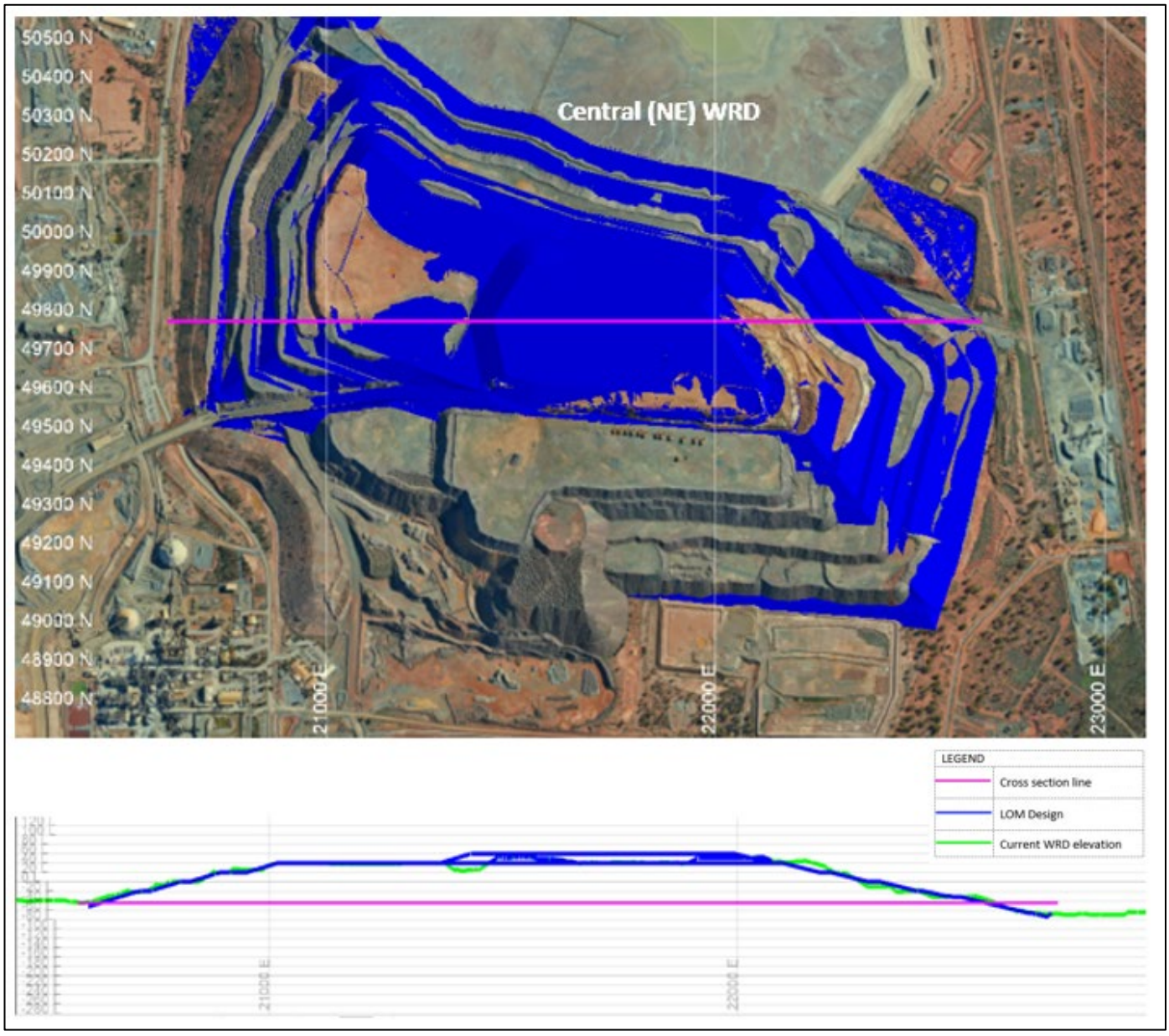


Figure 9-19: Fimiston Central WRD Closure Design and Cross Section

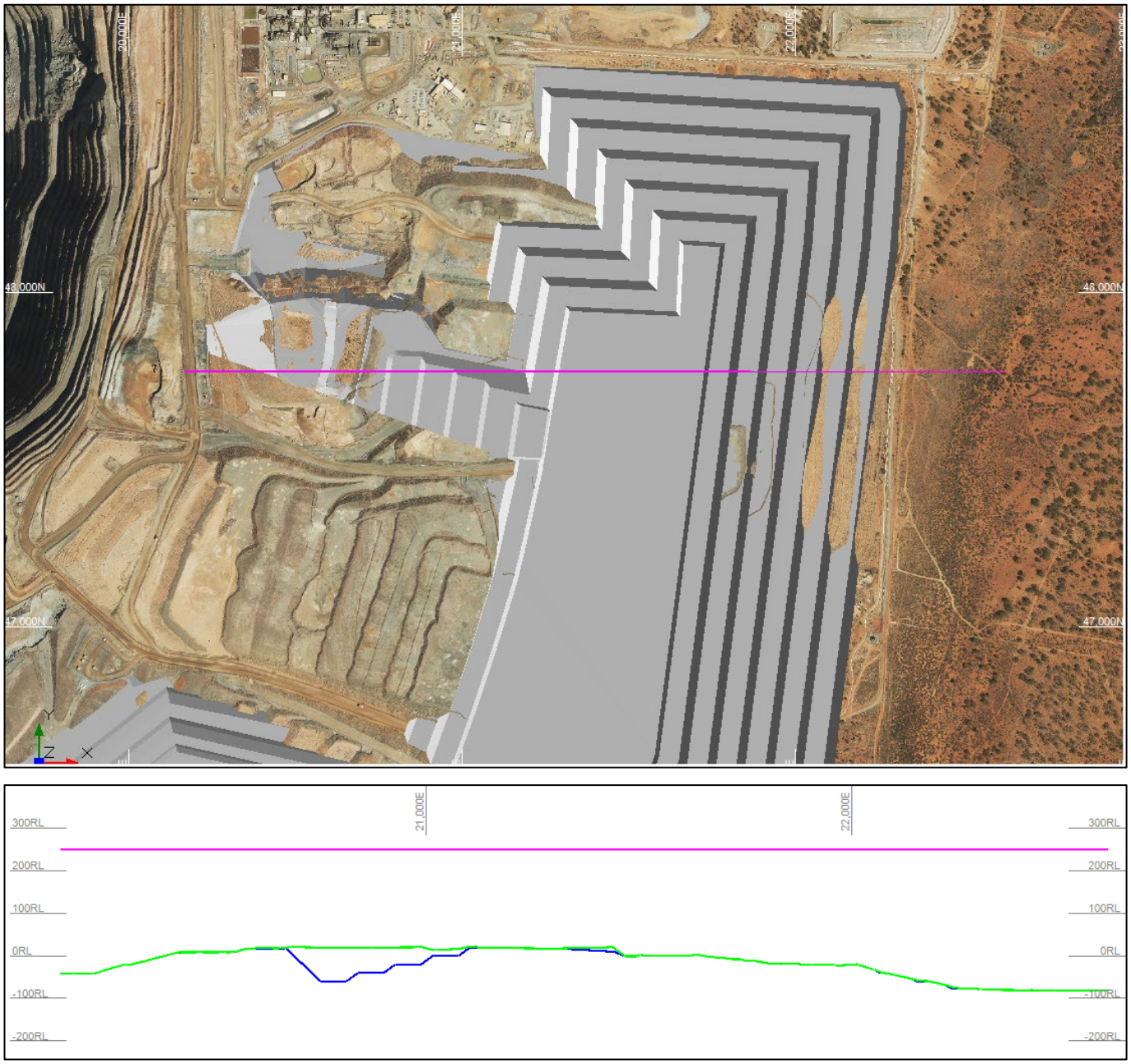


Figure 9-20: Fimiston Oroya WRD Closure Design and Cross Section

Note: the hollow displayed is caused by processing of a sub marginal stockpile, but the area is expected to be backfilled with waste rock

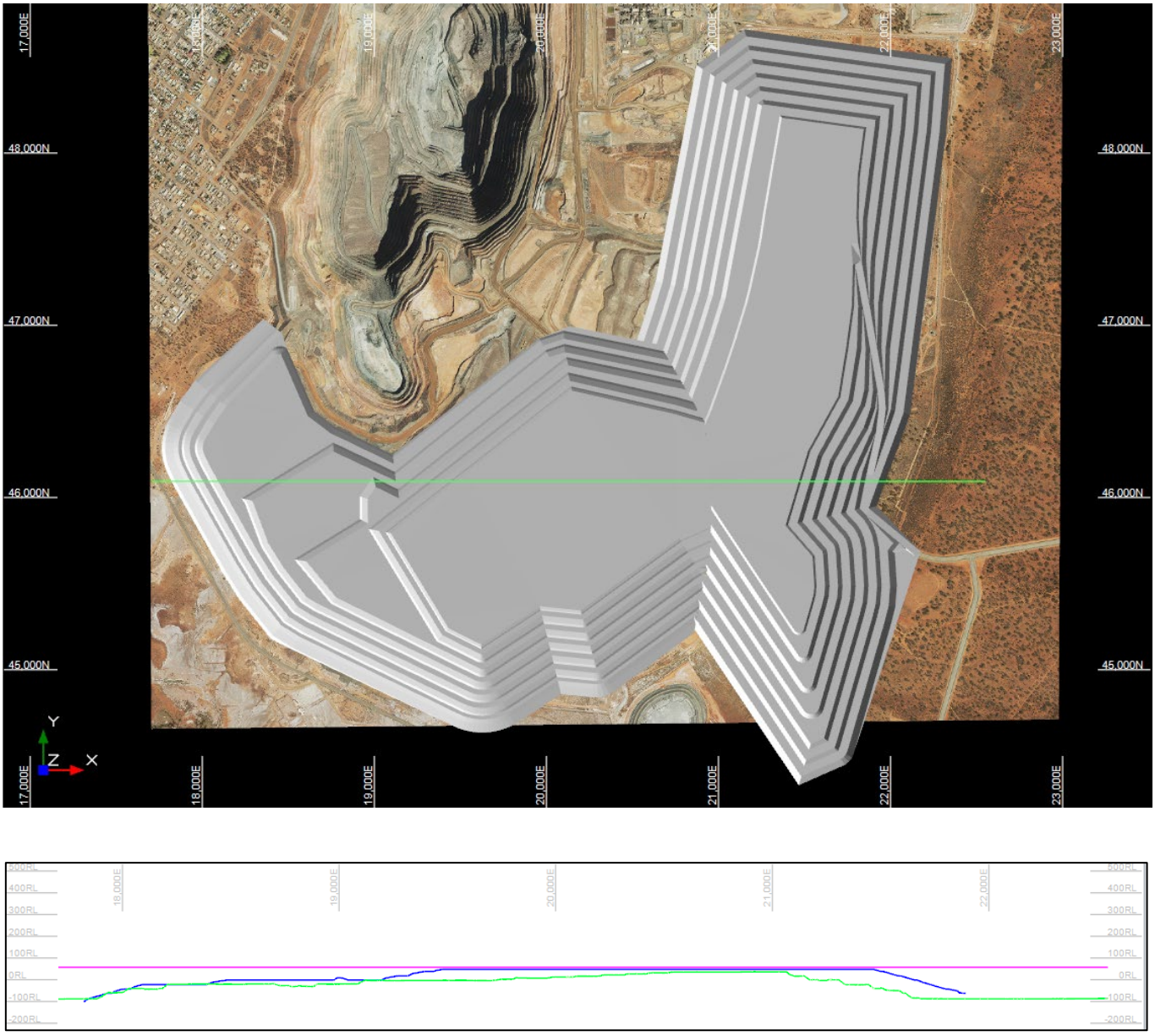


Figure 9-21: Fimiston Trafalgar WRD Closure Design and Cross Section

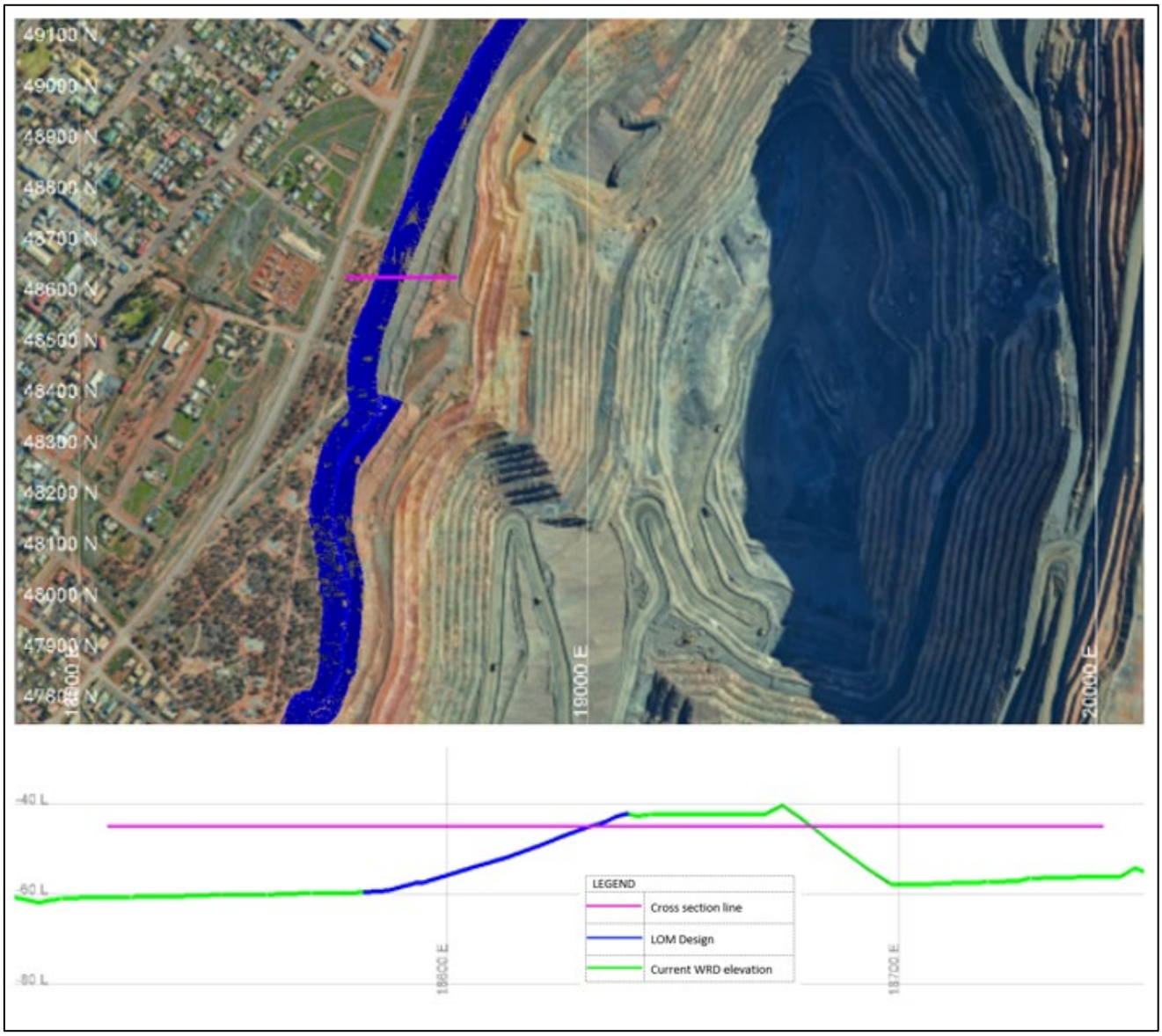


Figure 9-22: Fimiston Noise Bund WRD Closure Design and Cross Section

Figure 9-23: Operational Fimiston South Noise Bund (not a closure landform)

The operational NB for Fimiston South project will be used as a source of competent waste rock for the abandonment and any other closure landform or remedial works.

9.2.3.5 Rehabilitation Materials for Fimiston Operational Area

9.2.3.5.1 Application of Visual Amenity Concept

Growth media resources at the Fimiston Operational Area are in short supply. Usage of materials must be optimised. To provide a framework for decisions related to scheduling material for rehabilitation, the visual amenity concept was developed. Areas on WRDs, and to a certain extent on TSFs, are given a rating based on visibility from the City of Kalgoorlie-Boulder. Visual Amenity 1 areas are located on the western side of Fimiston Operational Area, and are highly visible to the City. Visual Amenity impact decreases in an eastern direction, with the areas furthest away and least visible ie the eastern slopes and all the flats of the WRD, given the lowest rating of VA4 (refer to Figure 9-24) showing the VA area distribution for Fimiston WRDs. Within each VA area, topsoil is prioritised to slopes, and Class D or oxide materials are used for Flat areas.

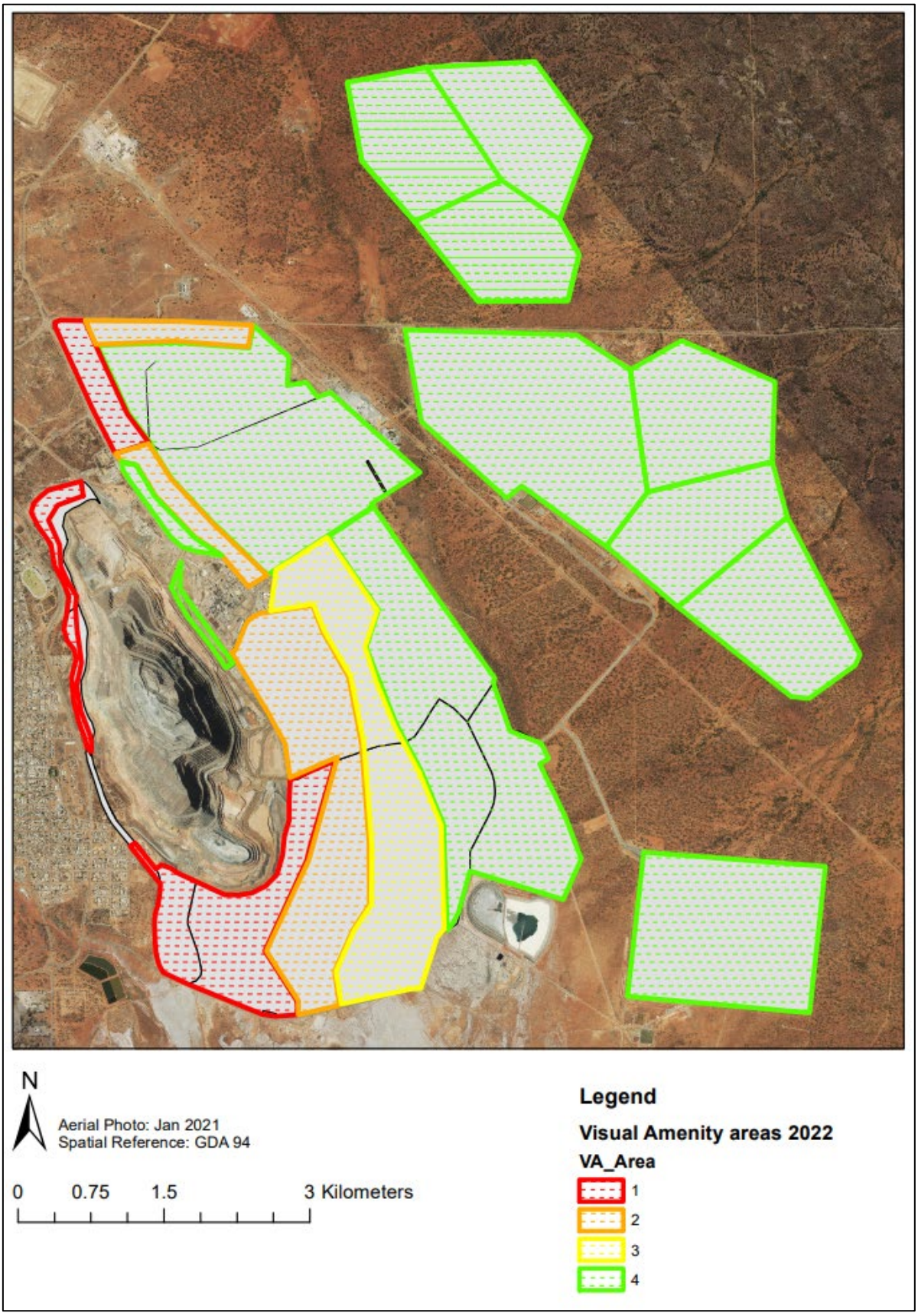


Figure 9-24: Fimiston Operational Area Landforms, showing the Visual Amenity areas

9.2.3.5.2 Available Rehabilitation Resources

The existing growth media resources at Fimiston Operational Area are classified by their soil properties. The classification system is described in detail in Section 5.1.4.1 in Vol 1. In general, Class A, B and C are suited for slope rehabilitation. The majority of the Class D materials are not suitable for slopes (small volumes of subsoil Class D materials may be suitable for slopes) and will be used on the flat areas. Class D materials are saline and will require leaching of salts before growth of salt tolerant species is possible. Data has been collected to determine a statistical linkage between soil chemical properties, primarily salinity, and plant growth. This information was presented as a paper at the 2021 GEMG conference in Kalgoorlie (Lison, Christine & Howard, Evan (2021) Soil Drivers of Plant Growth and Diversity: Implications for Development of Mine Closure completion Criteria). In general, at KCGM, it can be said that vegetation cover drops below 10% when the $EC_{1:5}$ is above 2 dS/m and Chloride is greater than 2500mg/kg. This information is directly relevant to oxide rehabilitation material (Class D) available at KCGM and possibly some of the topsoil material. The oxide material will require leaching (i.e. rainfall and time) prior to grow of salt tolerant species being possible. Further work is planned to integrate these findings into the completion criteria for KCGM.

When both the soil classification and visual amenity concept are combined, availability of rehabilitation resources and requirements can be calculated. Due to shortages, growth media resources (topsoil) must be assessed on a site wide basis. A summary is provided in Table 9-15, which describes quantities available and quantities required at both the WRDs and TSFs. The lower half of the table provides 3 scenarios, with a material balance for each. The most likely outcome is that there are sufficient site wide resources for growth media for VA 1 to VA 3, and enough resources for approximately 25% to 50% of VA4 to receive growth media.

Table 9-15: Fimiston Material Balance

WRDs	Volume growth media (m3)		TSFs	Volume growth media (m3)		Fimiston Whole of Site Growth Media Balance	
	Material suitable for Flat areas	Material suitable for Slope areas		Material suitable for Flat areas	Material suitable for Slope areas	Material Balance for Flat areas	Material Balance for Slopes areas
Current Fimiston WRD requirements	1,501,720	1,858,820	Current Fimiston TSF requirements		485,270		
Change due to new Trafalgar WRD design	-	-	Fim IIE 3 cell requirements		323,479		
Forecast future WRD requirements	200,000	162,387	Forecast future TSF requirements (estimate, Fim III)		300,000		
Total required WRDs	**1,701,720**	**2,021,207**	**Total required TSFs**		**1,108,749**		
Growth media available in current WRD stockpiles	1,378,086	977,401	Growth media available in current TSF stockpiles		880,900		
Growth media recovered from Trafalgar WRD prior to implementation of new design	56,500	13,500	Growth media forecast from Fim IIE footprint	336,000	1,554,372		
Growth media forecast available in WRD stockpiles	**1,434,586**	**990,901**	**Growth media forecast available in TSFs stockpiles**	**336,000**	**2,435,272**		
Total required for WRDs			**Total required for TSFs**		**808,748**		
Scenario 1: whole of WRD has growth	1,701,720	2,021,207					
Shortfall for Scenario 1	- 267,134	- 1,030,306	Excess at TSFs	336,000	745,624	68,866	- 284,683
Scenario 2: 25% of VA4 has growth me	1,701,720	1,831,912					
Shortfall for Scenario 2	- 267,134	- 841,011	Excess at TSFs	336,000	745,624	68,866	- 95,387
Scenario 3: 50% of VA4 has growth me	1,701,720	1,737,264					
Shortfall for Scenario 3	- 267,134	- 746,363	Excess at TSFs	336,000	745,624	68,866	- 740

Assumptions: flat areas rehabiltated with poorer quality soils such as Class D/oxides
Visual Amenity concept is implemented to optimise use of available resources

Assumptions: top of TSFs capped with WRD or pit oxide
Upper embankments of Kaltails have no growth media, as per approvals

Overall balance for Scenarios
Current designs and available growth media allow for approx. 25% of VA4 areas to have growth media

9.2.3.6 Closure Implementation Status

9.2.3.6.1 Completed Closure Tasks and Studies

For details on Tasks please refer to the current and planned closure Projects in Section 7.5.1 (Volume 1).

Table 9-16: Completed Closure Tasks for Fimiston WRD Domain

TASK	TARGET COMPLETION DATE/PERIOD
Refine Visual Amenity concept	**Completed in 2017** Continuous improvement will drive minor changes and adjustments
Waste Dump Closure Planning Strategy, including implementation of a new rehabilitation design	**Completed in 2017** Continuous improvement will drive minor changes and adjustments
Review of Materials Classification System (erodibility focus)	**Completed**
Update Materials Balance Inventory/Rehabilitation Material Reconciliation	**Completed; updates are ongoing** Will be updated for any new projects providing additional resources; due to optimisation of resource usage, the inventory must be managed holistically for the whole of Fimiston Operational area, across both WRDs and TSFs.
Review of rehabilitation monitoring programme	**Completed; updates are ongoing** The completion criteria were updated after field reviews of existing rehabilitation (with the program hampered by Covid 19 restrictions) ; This work included rehabilitation monitoring recommendations. Studies were undertaken to analyse the impact of salinity on rehabilitation vegetation growth, with the outcomes presented at the GEMG conference in 2021.
Refine completion criteria	**Revised for MCP 2021**
Acquisition of Additional Rehabilitation materials	**Completed** Sourced ACM free topsoil from the Prison redevelopment project
Geochemical studies of Waste Materials	**Completed**
Final WRD Report	Scheduled for after rehabilitation of all WRDs

9.2.3.6.2 Planned Closure Tasks and Studies

For scheduling details on Tasks please refer to Section 9.7.

Table 9-17: Planned Closure Tasks for Fimiston WRD Domain

TASK	TARGET COMPLETION DATE/PERIOD
Update closure designs if LOM requirements change	**As required** Ensure that resource planning allows for future growth media usage to be optimised as much as possible
Review materials balance & VA for newer WRD designs	2023; provide in following MCP
Review of Materials Classification System And Completion Criteria	**F**urther updates if there is additional clearing / further information from studies eg salinity vs plant density

TASK	TARGET COMPLETION DATE/PERIOD
Update Materials Balance Inventory/Rehabilitation Material Reconciliation	**Revise with new Fimiston South landforms; updates are ongoing** Will be updated for any new projects providing additional resources; due to optimisation of resource usage, the inventory must be managed holistically for the whole of Fimiston Operational area, across both WRDs and TSFs. The details of the materials balance will be revised to align with the changes to the Fimiston South WRDs in 2022/2023. A revised materials balance will be provided in the next MCP.
Review of rehabilitation monitoring programme	**Draft Completion Criteria in this MCP** The completion criteria were updated after field reviews of existing rehabilitation (with the program hampered by Covid 19 restrictions); This work included rehabilitation monitoring recommendations. Work is expected to continue, including field trial work (at least a further 2-3 years). Implement photographic monitoring at WRDs in the 2022 – 2025 closure planning cycle. Refine expectations and targets for rehabilitation regrowth, including key soil parameters into the process.
Acquisition of Additional Rehabilitation materials	Investigating potentially sourcing additional clean mulch to improve rehabilitation topsoil in 2022
Long term aeronautical requirements	5 years from closure, commence development of a detailed plan for long term management of airport lighting with future management party/ Shire, including timings and funding.
Final WRD Report	Scheduled for after rehabilitation of all WRDs

9.2.3.6.3 Completed Rehabilitation Activities

This section describes the status of closure implementation, i.e. progressive rehabilitation or progress towards completion of closure activities.

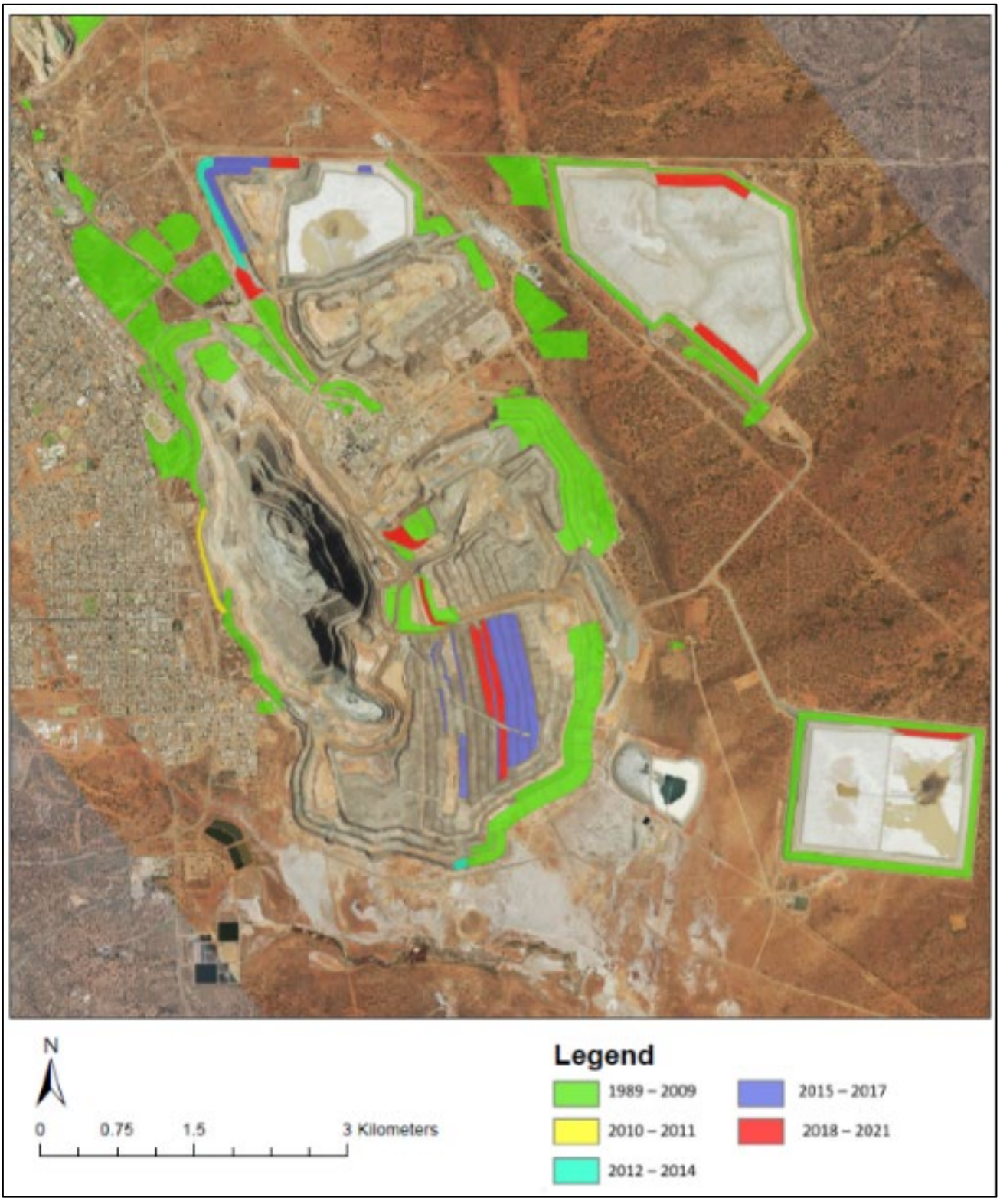


Figure 9-25: Progressive Rehabilitation at Fimiston WRDs 1995-2022

Table 9-18: Completed Rehabilitation Activities for Fimiston WRDs (Implementation Status – 2022)

FIMISTON WRD	STATUS	DATE	CLOSURE TASKS COMPLETED	REHABILITATION ACTIVITIES COMPLETED
Trafalgar WRD	Active WRD	2005 – 2009	• Golden Pike PER and Mining approval.	• South east and south slopes battered, sheeted, ripped and seeded.
		2015 – 2018	• Mining Proposal (RegID 59160) for Eastern WRD approved in 2016, aligned with Visual Amenity Concept; • Mining Proposal (RegID 69903) for all Fimiston WRD approved in 2017, including the Visual Amenity Concept. Areas where the new design will be implemented are clearly defined, and those where older designs have already been implemented are mapped; • Vegetation monitoring/trialling field implementation;	Progressive Rehabilitation: • 2015: slope push down work completed on Trafalgar • 2016: 24 ha completed to seeding • 2017: 22 ha completed to seeding
		2019 – 2022	• Completion criteria and salinity studies • Mining Proposal (RegID 99415) for all Fimiston WRDs approved in 2021; including the Visual Amenity Concept and increased footprint of Southern WRD;	• 64.45 ha rehabilitated by end of 2020 • 2023 rehabilitation of southern Western slopes and establishment of a permanent ramp to the new visitors look out.
Oroya WRD	Active WRD	1998		• Bottom lift of eastern slopes battered, sheeted with growth material, ripped, narrow backsloping berms cut in and seeded.
		2003		• Northern end of eastern slopes first lift and all of second lift were battered, sheeted with oxide, ripped, seeded and narrow backsloping berms cut in.
		2004-2005		• Eastern slopes third lift was battered, sheeted with growth material, ripped, narrow backsloping berms cut in and seeded. • 1-2 m high crest bund constructed. • Dump top sheeted with oxide – not seeded.
		2006-2007		• Radio Hill battered, sheeted with oxide, ripped, seeded. • Old Tetleys battered, sheeted with oxide, ripped, seeded.

FIMISTON WRD	STATUS	DATE	CLOSURE TASKS COMPLETED	REHABILITATION ACTIVITIES COMPLETED
		2015-2018	• Mining Proposal (RegID 69903) for all Fimiston WRD approved in 2017, including the Visual Amenity Concept. Areas where the new design will be implemented are clearly defined, and those where older designs have already been implemented are mapped; • Mining Proposal (RegID 99415) for all Fimiston WRDs approved in 2021; including the Visual Amenity Concept and increased footprint of Southern WRD; • Large improvement project implemented to design rebuild Oroya eastern crest bund, to prevent large failure and erosion on the eastern slopes; • Design for rework of Radio Hill (medium Visual Amenity); • Design for rework of upper lift of OTD (medium Visual Amenity)	Progressive Rehabilitation: 2017/8: approx. 4.8 ha (Radio Hill) and 3.9 ha (OTD) located in Visual Amenity Zone 2 reworked, due to erosion • Construction of eastern crest bund on Oroya WRD
		2019 - 2022	• Mining Proposal (RegID 99415) for all Fimiston WRDs approved in 2021; including the Visual Amenity Concept and increased footprint of Southern WRD;	
North Eastern WRD	Active WRD	1990-1992		• Black St Rehabilitation Trials commenced.
		1998		• North western slopes ripped, sheeted with material, seeded and backsloping berms cut.
		2006		• Pad 19 battered, sheeted with growth material, ripped and seeded. • Eastern Slopes battered, sheeted with growth material, ripped and seeded.
		2015-2018	• Planning of detailed design for the WRD commenced during this period; • Mining Proposal (RegID 69903) for all Fimiston WRD approved in 2017, including the Visual Amenity Concept. Areas where the new design will be implemented are clearly defined, and those where older designs have already been implemented are mapped. Mining Proposal included an extra lift, to potentially act as a rock capping over oxide material.	No new rehabilitation areas available on this WRD during this period

FIMISTON WRD	STATUS	DATE	CLOSURE TASKS COMPLETED	REHABILITATION ACTIVITIES COMPLETED
Northern WRD	Active WRD	2012 – 2014	• Revision of approved design through erosion modelling and materials characterisation.	• Earthmoving trial of new Erosion Resistant design commenced on lower Black St lift.
		2015-2022	• Mining Proposal (RegID 69903) for all Fimiston WRD approved in 2017, including the Visual Amenity Concept. Areas where the new design will be implemented are clearly defined, and those where older designs have already been implemented are mapped. Approved design included an extra lift for potential location of capping material stockpile. • Vegetation monitoring/trialling field implementation	NEW 2 and NEW 4 slopes rehabilitated 29 Ha of rehabilitation 2022: Recommence rehabilitation activities on WRDs, starting with NEW 6 slopes.
Environmental Noise Bund	Rehabilitation completed; monitoring phase	1995-1996		• Southern NB battered, sheeted with material, seeded and hand planted.
		2001		• Lower west facing lift of Croesus NB battered, sheeted with material, hydro mulched and seeded.
		2003		• Repair work on 2001 rehab on Croesus NB completed. • Second west facing lift battered, sheeted with material and seeded.
		2008-2009		• Second west facing lift stripped of excess material, re-ripped and seeded. • Southern section of first lift regraded, sheeted with material and seeded.
		2011-2012		• Golden Pike NB battered, sheeted with material, ripped and seeded.
		2015-2022		

9.2.3.6.4 Planned Rehabilitation Activities

For the timing of Rehabilitation Activities, please refer to the consolidated Schedule of Activities in Section 9.7.1.3 KCGM conducts progressive rehabilitation at Fimiston WRDs. Once an area is finished to final tipping design, it is released for rehabilitation works. At present there are no completed outer faces available for rehabilitation.

Table 9-19: Planned Closure Rehabilitation Activities for Fimiston WRD Domain

DOMAIN	FEATURE	APPROACH
Waste Rock Dumps	Trafalgar, Oroya, Northern, North Eastern, Environmental Noise Bund	• Implement the Visual Amenity Concept; • Encapsulation of historic TSFs and TSF footprints that are within the waste dump footprint; • Conduct progressive rehabilitation on available areas. *For new rehabilitation/progressive rehabilitation:* • Profile outer batters of landform to reduce long term erosion and promote stability; • Construction of robust crest bunds; • Where appropriate, profile upper surface for water control; • Cover outer surface with appropriate growth medium if available; and • Cross rip to ensure correct rock cover on surface, and • Seed with native species of local provenance. *For existing rehabilitation:* • Specifications in alignment with original approvals.

9.2.3.7 Information Gaps for Fimiston WRDs

Knowledge gaps for Fimiston WRDs closure implementation have been considerably reduced through the development of the WRD Closure Strategy. The strategy included characterisation of all available rehabilitation materials, development of designs for rehabilitation that are suited to the available materials and optimised scheduling of the rehabilitation materials to meet the objective of the Visual Amenity Strategy.

Observations of completed rehabilitation and review of completed works continue to allow for improvement in future progressive rehabilitation.

Further studies and field test work is required on the measurement of Sustainable land use completion criteria, to improve the monitoring method as well as validate and verify that there is a good linkage between the monitoring method and the criteria.

During the initial part of the Fimiston South (S38) project, a greater volume of oxide will be transferred from the Fimiston Open Pit to the Fimiston WRDs; planning has been undertaken to ensure there is sufficient capacity in WRDs to maintain rock slopes on the WRDs. This work will continue to be fine tuned during the next MCP period.

9.2.3.8 Key Tasks for Premature Closure

An overarching strategy for Premature Closure is described in Section 9.1.3.

For premature closure, most of the rehabilitation will be up to date due to KCGM's strategy for progressive rehabilitation. WRDs with stockpiles would not be able to be completely rehabilitated until a decision could be made on whether the site was moving into Care and Maintenance or the intention was to restart operations. Should this not eventuate, closure works described in the section would be implemented. During this interim period, minimal maintenance would be required for this Domain. An assessment would need to be made on encapsulation of the BF high grade ore stockpile, however as the ARD potential is long lag, there would need to be considerable time to make the decision to implement the capping design.

9.2.4 Fimiston Mineral Processing Infrastructure Domain

9.2.4.1 Description of the Domain

Figure 9-26: Fimiston Processing Plant

The Fimiston Mineral Processing Plant Domain consists of:

- Two crushing circuits that supply coarse ore as a mill feed stockpile;
- Two milling circuits – Fimiston and Mt Charlotte;
    - Fimiston circuit comprises a semi autogenous grinding (SAG) mill and a pebble crushing circuit with two secondary ball mills and four Knelson concentrators.
    - Mt Charlotte circuit is a single SAG mill and a ball mill with a single Knelson concentrator.
- A flotation circuit and three Carbon in Leach (CIL) circuits through which milled ore is processed;

- Filtration and Ultra Fine Grind via a CIL circuit through which flotation concentrates are deslimed and processed; and
- A gold recovery circuit comprising an Acacia reactor, elution, electrowinning, smelting and pouring and production of gold bullion.
- Ore stockpile areas.
- Processing plant areas (hypersaline water supply for the Processing Plant.
- Concentrate stockpile area.
- Downstream lined catchment dams (to the south).
- Offices, workshops and laydown areas.

Pipelines have been grouped in the Water Abstraction and Containment Facilities Domain.

Table 9-20: Area of Disturbance and Closure Dates for Fimiston Mineral Processing Domain

DOMAIN: FIMISTON MINERAL PROCESSING INFRASTRUCTURE	AREA OF DISTURBANCE	STAGE OF REHABILITATION
Plant and Support Infrastructure	51.5	Operational until 2035

9.2.4.2 Applicable Land Use Outcomes

9.2.4.2.1 Post Mining Land Use and Closure Criteria

The applicable land use outcomes are provided in Table 9-2, with modified landscape the final land use for all areas.

Relevant Closure Completion Criteria are provided in Table 9-21.

Table 9-21: Completion Criteria for Fimiston Mineral Processing Plant

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe	Inadvertent access is restricted as much as practicable to any landforms or structures that are considered unsafe.	Removal or burial of all mine structures/buildings/foundations and machinery by suitable demolition / civil company unless legal liability accepted by post mining land owner. Transfer of ownership including legal documentation agreed to within reasonable timeframe (2 years), with legal documentation completed at time of closure implementation.	Buildings and Infrastructure	The footings/foundations/anchors of all mine structures/buildings/services to be buried at least 0.5 m below the final land surface.	Compliance certification (photographic and survey data) provided by demolition contractor for submission in Final Mine Relinquishment Report.
Non Polluting		Operational hazardous materials management practices continued during closure operations. Chemical inventory drawn down close to closure with pipelines and vessels cleaned. Inspection prior to demolition. Implement requirements of Contaminated Sites Act for identified risk areas, analysis by competent specialists.	Mineral Processing areas – Fimiston	All reagents and chemicals removed from site with any residual site contamination investigated and actioned as per the Contaminated Sites Act 2003.	As required, monitoring in accordance with Contaminated Sites requirements.
Sustainable Land Use	Rehabilitate disturbed areas to a modified landscape receptive to vegetation regrowth and recovery over time considering visual amenity and properties of available	Vegetation attributes in rehabilitated areas to have values indicative of the target post mining land use. Salinity and other constraints on vegetation growth are acknowledged in monitoring and assessment of completed rehabilitation. These data are used to underpin the vegetation attributes criteria and understanding the	Fimiston	Fimiston operational area revegetation has values indicative of the agreed post mining land use, modified landscape, accounting for placement of rehabilitation material types (implementation of the Visual Amenity Strategy).	Rehabilitation performance monitoring using accepted vegetation monitoring techniques and measures. Includes assessment against target values, and demonstration of the ability to become self-sustaining (as detailed in Volume 2 Section 10).

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
	rehabilitation materials.	performance of rehabilitation across site.			

9.2.4.3 Closure Strategy

The Fimiston Processing Plant and associated infrastructure (Figure 9-26) will be demolished and the area rehabilitated to reflect the final land use. Contaminated Sites requirements will be planned during the operation phase, but can only be implemented during decommissioning when the footprint of the Processing Plant can be assessed. Both the Demolition Plan, with costing, and the Cyanide Decommissioning Plan have been updated and audited in 2014 and 2017. Key considerations for closure works at the Fimiston Processing Plant will be safety during decommissioning and demolition activities and Contaminated Sites requirements.

Rehabilitation of laydown areas, offices, mining workshops and crushing facilities are described in Table 9-2.

Safe – Demolition of Buildings and Infrastructure

After removal of chemicals and clean out of tanks, pipelines and other systems, and removal of reusable/ saleable components, demolition will occur as a single project. All structures and buildings will be safety decommissioned and demolished or removed from site, with concrete footings broken up and removed or buried *in situ*.

Non polluting – Hazardous Chemicals

Chemical inventories will be run down towards the end of operations, and unused chemicals will be removed from site prior to demolition.

Non polluting – Contamination

Contaminated Sites legislation requires for the Fimiston Mineral Processing Plant area to be investigated for potential contamination. Remediation and/or capping may be the end requirement if contamination is identified. Some areas of the Mineral Processing Area have the potential for contamination, such as the workshop or chemical mixing and storage areas. Areas will be risk ranked and investigated after demolition. The final decommissioning plan will provide additional focus on contaminated sites requirements. Refer to Section 7.4 (Volume 1) for further details relating to Contaminated Sites.

Sustainable Land Use – Rehabilitation

The Processing Plant area will be capped to meet Contaminated Sites requirements. The area will then be ripped to promote infiltration of rainfall and seeded with salt tolerant species.

9.2.4.3.1 Rehabilitation Materials for Mining Infrastructure Domain

Due to the shortage of rehabilitation materials at Fimiston, topsoil resources have not been allocated to these areas. Local topsoil, subsoil or oxide will be used where available.

9.2.4.4 Closure Implementation Status

9.2.4.4.1 Completed Closure Tasks and Studies

Table 9-22: Completed Closure Tasks and Studies for Fimiston Mineral Processing Domain

FEATURE	STATUS	WORK COMPLETED UP TO 2022
Fimiston Mineral Processing	Operational	• Contaminated Sites risk ranking process completed; • Further studies not applicable at this point in LOM; • Ongoing management of hydrocarbons and other materials of concern through the KCGM Environmental Management System

No rehabilitation activities have been completed for this Domain.

9.2.4.4.2 Planned Closure Tasks and Studies

For scheduling details on Tasks please refer to Section 9.7.

Table 9-23: Planned Closure Tasks and Studies for Fimiston Mineral Processing Domain

TASK	TARGET COMPLETION DATE/PERIOD
Demolition Planning	Completed (high level)
Opportunistic soil sampling	Ongoing

Demolition and rehabilitation activities for the Mineral Processing Infrastructure Domain can only be undertaken after the Mineral Processing Plant is no longer operational.

9.2.4.4.3 Planned Closure Rehabilitation Activities

For the timing of Rehabilitation Activities, please refer to the Schedule of Activities in Section 9.7.1.3

No rehabilitation activities have been completed for this Domain.

Table 9-24: Planned Rehabilitation Activities for Fimiston Mineral Processing Domain

FEATURE	APPROACH
Plant and Support Infrastructure	• Run down reagent inventory and hydrocarbons prior to closure date; • Salvage remaining gold from plant; • Remove buildings and other infrastructure; • Investigate potential contamination; • Cyanide decontamination of plant and equipment as per Cyanide Decommissioning Plan; • Decontaminate and make safe prior to demolition; • Dismantle/demolish all structures to below ground level; • Break up hard stand areas; • Break up concrete and bury or dispose of; • Break up scrap metal and recycle where possible; • Reshape surface where required; • Rip on the contour and seed with native species if the area is identified for revegetation; and • Dispose of assets: offer to other mine sites or auction.

9.2.4.5 Information Gaps

Knowledge gaps for Fimiston Mineral Processing Plant are primarily around potential contamination, which can only be studied in detail after demolition activities have been undertaken. Environmental management systems are in place during operations to minimise the potential for contamination to occur.

9.2.4.6 Key Tasks for Premature Closure

An overarching strategy for Premature Closure is described in 9.1.3.

For premature closure, Fimiston Mineral Processing Plant would require flushing of tanks and lines and other preparation tasks essential to allow a stage shutdown of equipment. Care and Maintenance involves removal of chemical inventory and clean out of tanks and lines. Waste water would go to the TSFs. The process would take a few weeks to implement. Tailings and other lines would be flushed out. Reagents and other usable items would be transferred to other mine sites or sold, until a decision could be made on whether the site was moving into Care and Maintenance or the intention was to restart operations or sell the operation. Should this not eventuate, closure

works described in the section would be implemented. During this interim period, minimal maintenance would be required for this Domain, but pumps and essential pollution control systems would be required to be operational.Fimiston Tailings Storage Facilities Domain

9.2.5 Fimiston Tailings Storage Facilities Domain

9.2.5.1 Description of Domain

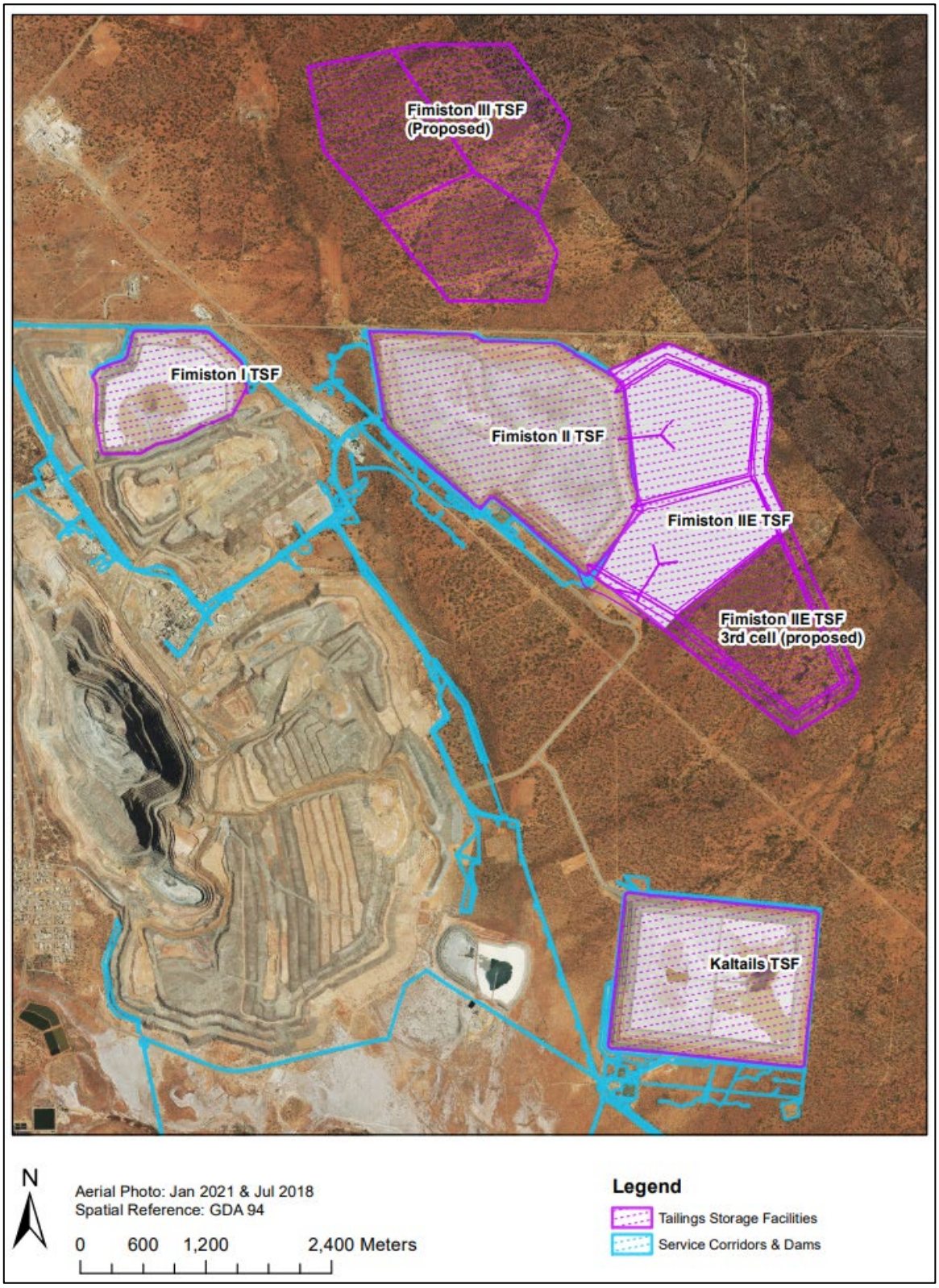


Figure 9-27: Fimiston Operational Area Tailings Storage Facilities

All Fimiston TSFs are relatively modern and are constructed using an initial earth starter embankment followed by upstream lifts constructed with tailings. Berms are generally 6 m wide and constructed every 10-15 m, with 14° batters. All three operational TSFs have completed rehabilitation on their lower outer batters. Construction of a newly approved TSF extension will commence in 2022.

The landform areas for rehabilitation area as follows:

- Fimiston I: Batters 28 ha; Flats 85 ha; Final height 60 m
- Fimiston II: Batters 78 ha; Flats 255 ha; Final height approved 60 m
- Fimiston II Extension: approved 2 cell extension, construction commencing in 2022/3; Batters 45ha; Flats 253ha; Final height 45 m
- Fimiston II Extension 3rd cell, as part of EPA S38 application; will abut the other Fimiston IIE cells, and have a similar area.
- Kaltails: Batters 23 ha; Flats 197 ha; Final height 45 m
- Fimiston III Batters 110ha; Flats 330ha; Final height 45 m. approximately 440 ha; at conceptual design level, part of EPA S38 application. Construction likely to commence post 2025 (estimate).

Between 2018 and 2020, both Fimiston II and Kaltails have had buttressing of some walls to ensure satisfactory geotechnical stability parameters. Buttressing may potentially continue to be implemented in locations recommended by the Engineer on Record, based on interpretation of the geotechnical monitoring instruments installed on the TSF walls. The final measured Factor of Safety for the TSFs at the end of the closure period is required to be 1.5. At this point it is impossible to predict the FoS for buttress areas at closure, therefore a conservative approach will be taken, This approach will assume that buttresses will not be reshaped at closure, with the buttresses remaining in the same configuration post closure, and not altered, to ensure the FoS remains acceptable.

Current (2022) disturbance and rehabilitation areas are presented in Table 9-25.

Table 9-25: Fimiston TSF 2022 MRF Disturbance and Rehabilitation Footprint

FIMISTON TSF	DISTURBED LAND (HA)	LAND UNDER REHABILITATION (HA)	TOTAL
Fimiston I	112	23	**135**
Fimiston II	328	50	**378**
Fimiston IIE	0	0	**0**
Kaltails	216	66	**282**
Fimiston III	0	0	**0**
Total	**656**	**139**	**795**

Anticipated closure dates for Fimiston TSF Domain are provided in Table 9-26, these might vary if implementation takes longer or groundwater completion criteria take longer than anticipated to be reached.

Table 9-26: Area of Disturbance and Closure Dates for Fimiston TSFs Domain

DOMAIN: FIMISTON TSFS	AREA OF DISTURBANCE (HA)	STAGE OF REHABILITATION	REHABILITATION DATE
TSFs	795	Operational until 2034	2034 + 2 to 3 years
Non- groundwater infrastructure	23	Operational until 2034	2034 + 2 to 3 years
Groundwater infrastructure	24	Operational until 2044	2034 + 10 years

The planned closure approach for Fimiston TSFs is summarised in the below table 9-27, and provided in greater detail in this Section.

Table 9-27: Closure Approach for Fimiston Operational Area TSFs

FEATURE	APPROACH
Domain: Tailings Storage Facilities	
Fimiston I, Fimiston II, Fimiston IIE, Fimiston III, Kaltails	• Conduct necessary geotechnical evaluations for FoS and geotechnical approval for implementation of works (this is done for each flank for operational closure); • Remove piping, decant pumps and other infrastructure; • Allow sufficient drying time (approx. 2-3 years) for upper surfaces; • Profile outer embankments of landform to reduce long term erosion and promote stability; • Cover outer slopes and surfaces with appropriate waste rock for erosion protection; • Cross rip and seed with native species if identified for revegetation; • Upper surface of TSF to be reshaped for water retention and capped with appropriate material for dust management; • Construction of robust crest bunds; • Maintain fencing to restrict access to landform until relinquishment (or no longer required); • Continue seepage and groundwater dewatering (seepage to be disposed of within the Fimiston Open Pit once the Fimiston Processing Plant is no longer operational) until monitoring confirms that active management is no longer required; and • Backfill all seepage trenches and ponds when no longer required.
Tailings Delivery and Decant Water Return Lines (including bunds)	• For above ground pipelines, flush and remove, and sell or recycle where possible, unless specified otherwise by appropriate approvals; • For buried pipelines, flush and leave buried unless they pose a future risk; and • Reinstate areas along pipelines and re-vegetate as appropriate.

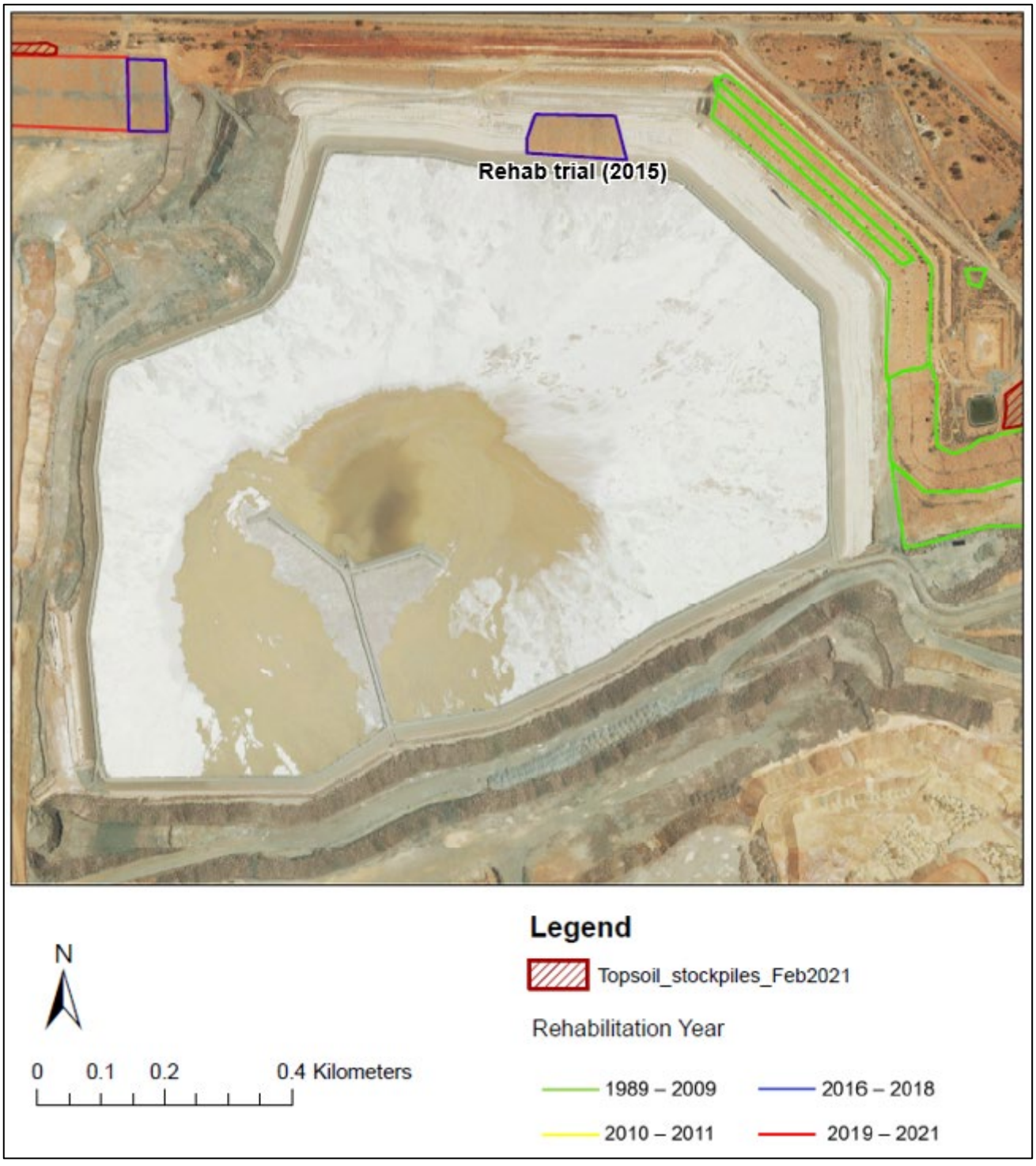


Figure 9-28: Fimiston I TSF current rehabilitation status (2022)

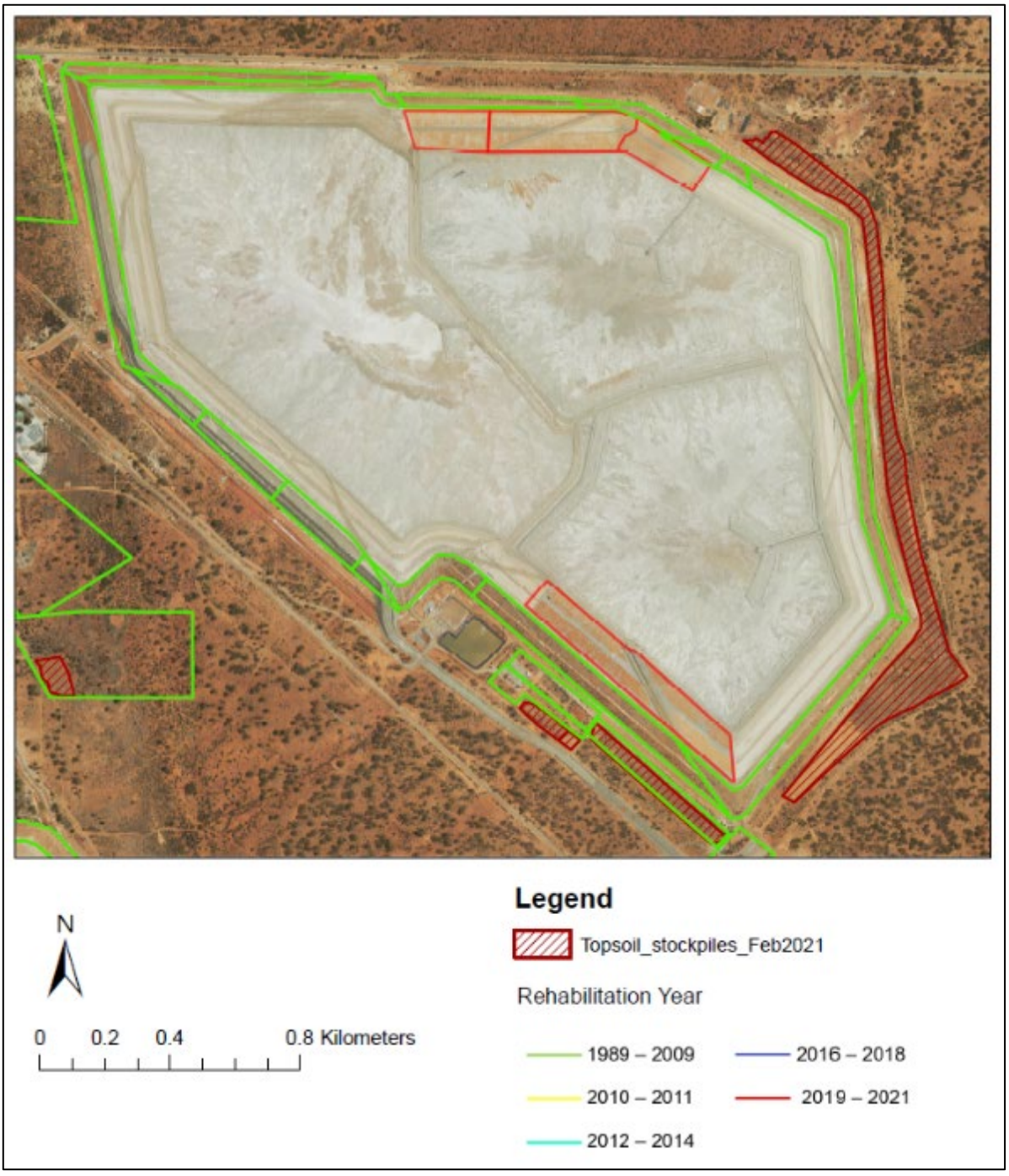


Figure 9-29: Fimiston II TSF current rehabilitation status (2022)

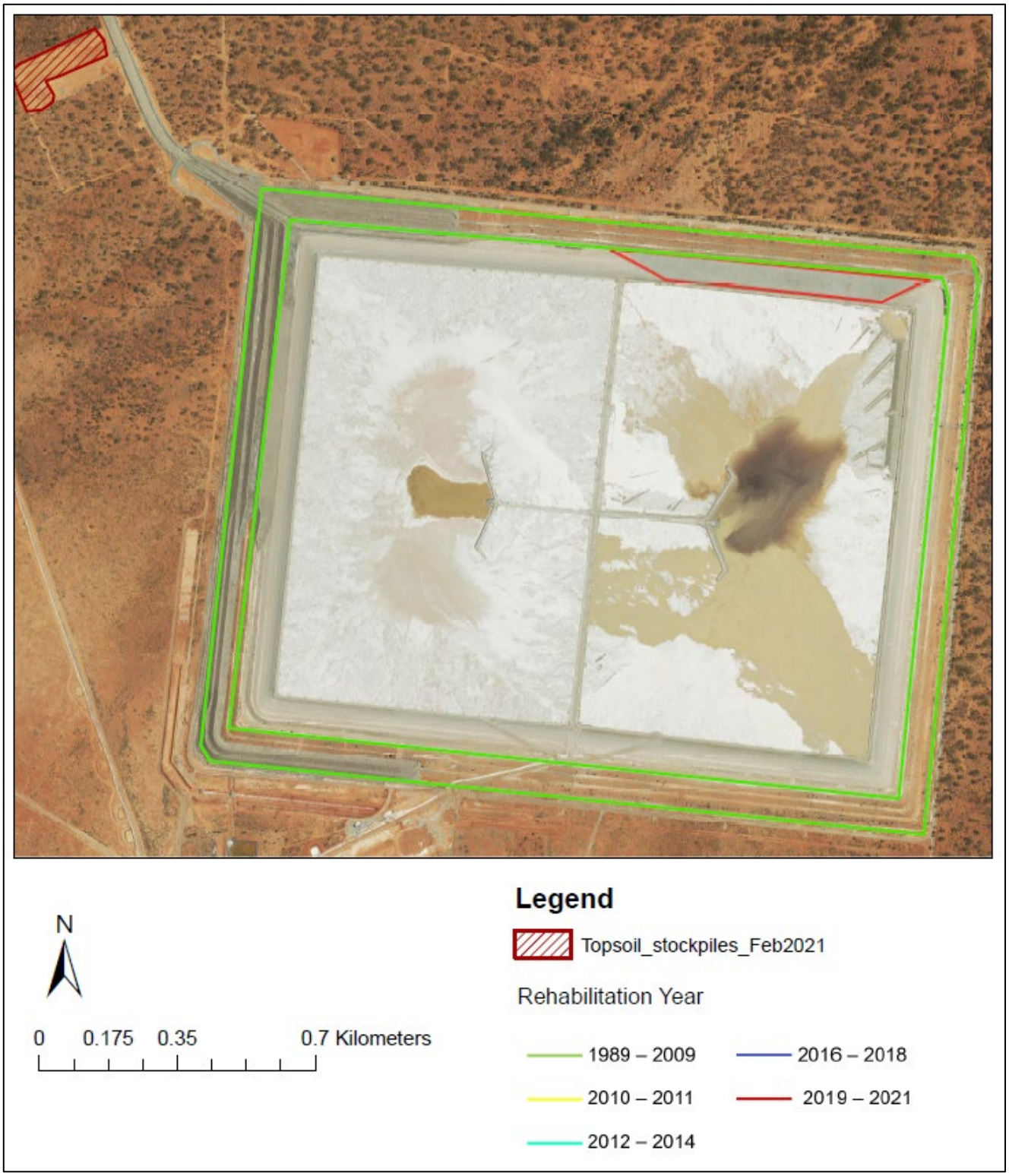


Figure 9-30: Kaltails TSF current rehabilitation status (2022)

9.2.5.2 Applicable Land Use Outcomes

9.2.5.2.1 Post Mining Land Use and Closure Criteria

The post closure land use for the Fimiston TSFs is a rehabilitated modified landscape with potentially restricted access (at least in initial post closure vegetation establishment phase). The TSFs are located on vacant crown land, with no underlying pastoral lease and are currently surrounded by a four-strand barbed wire or diamond mesh fencing. The eastern portion of the Fimiston IIE TSF (to be constructed) is located on a pastoral lease, and is unlikely to be an area suitable for pastoral grazing due to the risk of erosion from animals making pathways. Initially, TSF areas are likely to be zones of restricted access for safety reasons, as well as to allow for the initial establishment of vegetation. During closure implementation, an assessment will be done to identify any areas that may requiring longer term restricted access.

Table 9-28: Completion Criteria for Fimiston TSFs

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe	Inadvertent access is restricted as much as practicable to any landforms or structures that are considered unsafe.	Removal or burial of all mine structures/buildings/foundations and machinery by suitable demolition / civil company unless legal liability accepted by post mining land owner. Transfer of ownership including legal documentation agreed to within reasonable timeframe (2 years), with legal documentation completed at time of closure implementation.	Buildings and Infrastructure	The footings/foundations/anchors of all mine structures/buildings/services to be buried at least 0.5 m below the final land surface.	Compliance certification (photographic and survey data) provided by demolition contractor for submission in Final Mine Relinquishment Report.
		Limit ability of vehicular traffic to travel over crests through construction of adequately sized and positioned crest bunds on all possibly unsafe mine structures identified through area specific assessment. Incorporation of requirement into closure designs and planning. Fauna egress considered in design.	Mine waste landforms/ excavations	Crest / safety bunds constructed on any remaining excavation/ trench/channel/pit/embankment/ landform with slopes exceeding 25 degrees or depth exceeding 0.5 m.	Confirmation of construction of safety measures through visual inspection and/or aerial images.
Geo-Physically Stable	Mine landforms achieve long term geotechnical stability.	Implementation of site appropriate geotechnically stable designs for mine waste landforms. Final batter slope angle selection dependent on landform materials properties and cover material properties.	Mine waste landforms	Mine waste rock dumps and TSFs have slopes of <20 degrees (excluding buttressed areas).	Assessment at end of operations to ensure slopes are battered down and stable through site inspections or DTMs, recorded in MCP or associated closeout report.
		Monitor TSF draindown during closure period for TSF stability.	TSFs	TSF FoS > 1.5 at completion of closure monitoring and downward trending phreatic surface (ANCOLD 2019 or approved alternative).	TSF embankment stability assessment as per ANCOLD 2019 Guidelines, verified by suitably qualified engineer.
	Long term erosion stability and integrity of engineered mine	Effective landform surface drainage control measures based on landform water retaining designs.	TSFs	Appropriately implemented surface water management structures on TSFs as per ANCOLD 2019 Guidelines.	Design and implementation verified by suitably qualified engineer and recorded in MCP or associated close out documents.

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Geo-Physically Stable	landform covers based geomorphological processes observed within the local region.			Rehabilitation implementation meets design intent with appropriately implemented surface water management structures i.e. erosion resistant design has water catchment on benches and water retaining design slope cover.	
		Landform cover designs based on scientific modelling (300 yr time frame) or site specific trials/monitoring performance under expected regional climatic conditions. Rehabilitation Performance Assessment of trial plots and implementation of findings in final cover designs.	TSFs	Rates of erosion of landform covers are within an acceptable range taking into account regional climatic conditions and material characteristics and do not impact on the geotechnical integrity of the landform. No visual evidence of active gully erosion exposing underlying dispersive and/or unstable material.	Site inspection report and whole of landform aerial photographic analysis by suitably qualified professional.
		Where possible restrict access to rehabilitated mine waste landforms by human traffic and domestic livestock grazing to minimise potential for damage to constructed covers.	Mine waste landforms, especially TSFs	Perimeter fencing in place around all TSFs and access to Gidji TSFs restricted.	Site inspection records (including photographs and GIS mapping) to verify installation of fences to limit access recorded in MCP or associated close out documents.
Non Polluting	The landforms containing materials of concern will be managed to minimise impacts to the quality of the surrounding environment.	Minimisation of sediment movement from the immediate footprint of mine landforms through use of effective covers, drainage control and toe sediment retention bunds.	Mine waste landforms	Mine waste landforms do not actively discharge alluvial fans into adjacent natural drainage lines (creeks). No discharge of sediment or contaminants of concern beyond the assimilative capacity of the local environment based on Australian Standards.	Aerial photography verification of no active alluvial fans extending beyond the immediate foot print of mine waste landforms. Action if identified. Relevant post closure groundwater and surface runoff monitoring data.
		Formulation and implementation of post closure seepage management plan if	TSFs	No discharge of seepage waters that impacts on beneficial use of groundwater.	Groundwater level monitoring of appropriately scaled monitoring network,

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
		impacts on the beneficial users of groundwater and vegetation.		Groundwater levels remain below or at depth targets as documented in the post closure Seepage and Groundwater Management Plan	until proposed groundwater depth targets are achieved. Final groundwater closeout report by suitably qualified professional.
Sustainable Land Use	Rehabilitate disturbed areas to a modified landscape receptive to vegetation regrowth and recovery over time considering visual amenity and properties of available rehabilitation materials.	Vegetation attributes in rehabilitated areas to have values indicative of the target post mining land use. Salinity and other constraints on vegetation growth are acknowledged in monitoring and assessment of completed rehabilitation. These data are used to underpin the vegetation attributes criteria and understanding the performance of rehabilitation across site.	Fimiston	Fimiston operational area revegetation has values indicative of the agreed post mining land use, modified landscape, accounting for placement of rehabilitation material types (implementation of the Visual Amenity Strategy).	Rehabilitation performance monitoring using accepted vegetation monitoring techniques and measures. Includes assessment against targets values, and demonstration of the ability to become self-sustaining (as detailed in Volume 2 Section 10).

9.2.5.3 Closure Strategy

In 2013, a status assessment of the TSFs was undertaken, leading to KCGM developing an internal TSF closure strategy, with the final outcome the development of fit for purpose TSF closure designs and an approved Mining Proposal (RegID 75568) in 2018. Implementation on the upper embankments commenced in 2018.

The strategy has been progressively developed for closure of each KCGM TSF, with the following desired outcomes taken into consideration during development:

- Alignment of operational/ planning and environmental requirements;
- Development of final closure designs, specifications and standards, taking into account consideration of practical operational limitations;
- Optimisation of costs;
- Prevention of rework; and
- Ensure TSF design aligns with regulatory requirements and community expectations.

The strategy, broadly, involves:

- A period for consolidation and drying of the TSF post closure of approximately two to three years;
- Retaining existing older Fimiston TSFs rehabilitation on the lower flanks;
- The TSF buttresses will remain unrehabilitated, as any change would influence the position of the weight on the TSF embankment, affecting the FoS;
- Construction of robust crest bunds and store and release style covers on the tailings upper surfaces;
- Conduct necessary geotechnical evaluations for FoS and geotechnical approval for implementation of works (this is done for each flank for operational closure);
- Outer embankment slopes above the lower rehabilitated slopes to be regraded to form a continuous linear slope, where possible;
- Rock armouring the upper outer embankments of each TSF using suitable mine waste rock;
- Stormwater management via bench drains with downchutes (with energy dissipation structures and channels at the toe) to convey storm runoff generated from the upper slopes to ground level. Further stormwater management systems such as simple diversion trenches will guide this stormwater water to suitable entry points in the catchment;
- Seepage management continuing in the post mining period via blanket toe drains and production bores until no longer required. Recovery water will be pumped to the Fimiston Open Pit once the Fimiston Plant is no longer operational;
- All tailings pipelines and pump stations being flushed prior to decommissioning once no longer required, with tailings lines and pumps removed; and
- The TSF areas likely being designated as zones of restricted access for a period of time, for safety and to protect established vegetation.

Further detail on the above described strategy and the considerations taken into account during its development are outlined in the following sections.

The developed closure strategy for the Fimiston TSFs requires competent waste rock to be available for closure and rehabilitation. Ample competent rock is available within the Fimiston WRDs, however, due to the considerable volumes required and long haul from active mining areas, haulage for Fimiston II and Kaltails TSFs was calculated to be a considerable cost and time impost post closure. Due to the proximity to the open pit and the Northern WRD, short haul routes for waste rock are readily available for closure of Fimiston I. In 2018, the Mining Proposal for Fimiston TSF Closure Implementation (RegID 75568, 2018) was submitted to DMIRS and approved. The Mining Proposal included the closure design for the three operational Fimiston TSFs, a haul road to link the WRDs (source of capping material) to the Fimiston II and Kaltails TSFs and most likely locations of capping material on the WRDs. In late 2018 and early 2019 construction of a TSF haul road was completed, allowing waste rock from the Eastern

WRD (the easterly section of Trafalgar WRD) to be hauled directly and stockpiled at Fimiston and Kaltails facilities. In April 2019 progressive rehabilitation works commenced on the embankment slopes of the Fimiston II TSF.

9.2.5.3.1 Safety Considerations

Safe – Removal of buildings and infrastructure

Removal of buildings and infrastructure at the decant ponds will be required at a point when the water balance has stabilised. Facilities related to the management of saline water will remain in place for an estimated 10 years post closure to manage groundwater levels, with pumpage of seepage water back to the Fimiston Open Pit.

Safe – Prevention of inadvertent access

In the post closure period, the TSF areas are likely to be designated as zones of restricted access for safety reasons as well as to protect established vegetation. The TSFs are surrounded by a 4-strand barbed wire fence. Where appropriate, and required by approvals, and where rehabilitation materials are available, revegetation will be encouraged.

While not critical for the Fimiston TSFs, limited access would allow revegetation to become established and prevent damage to the landforms.

9.2.5.3.2 Geotechnical Considerations

Geophysical – Long term geotechnical stability

Geotechnical instability of the tailings is an important consideration, with the requirement for an acceptable factor of safety (FoS), in accordance with ANCOLD (2019), to be in place during operations and post closure. Additionally, the phreatic surface is predicted to reduce post closure, resulting in an increasing FoS over time. Post closure infiltration of incident rainfall is expected to be minor and is not anticipated to result in an increased phreatic surface, and hence a satisfactory FoS will be maintained (Golder, 2018b).

Rock buttressing has been placed on some of the Fimiston TSFs, and may continue to be implemented at new locations, placed to ensure the FoS is maintained. These buttresses will not be reshaped at closure as this would alter the weight loading on the TSF walls.

Geophysical – Long term erosion stability

KCGM has invested considerable time and expense into development of erosionally resistant designs for the TSFs.

The closure design predominantly involves rock armouring the outer embankments of each TSF using suitable mine waste rock. The rock armour ensures the integrity of the facility for the design life required by the regulator.

Substantial studies have been undertaken to understand TSF cover design requirements in terms of prevention of wind and surface water erosion. The thickness of the rock armouring required is anticipated to be nominally 0.5 m. This thickness was reached through erosion modelling studies undertaken by Landloch. In addition, a significant amount of soil characterisation work and modelling by Landloch has ensured a design that is suitable for the stockpiled materials and in situ future topsoil resources.

On existing TSFs, the external embankment slopes above the lower rehabilitated slopes will be regraded to form a continuous linear slope, where possible. Detailed design of TSF flanks will be done immediately prior to implementation, particularly if implementation occurs during the operational period, and will be specific to the section TSF slope. On Fimiston II and Fimiston I, an adjustment is required to fit existing operational designs with a dual angle slope and a rocky bank on the inflection point. Some slopes will have outer surface designs similar to the erosion resistant design used for the Fimiston WRDs, with rocky bands placed horizontally at key locations to manage the potential for water erosion. The location of these areas is guided by the visual amenity concept, the geometry of the TSF flank and the properties of the rehabilitation materials used.

On all Fimiston TSFs, rehabilitation of the lower flanks of the TSFs has already been completed. Due to the substantial step in bench above the rehabilitated flanks, storm water from this bench drain will be diverted to ground level by a downchute, consistent with existing down drains on the Fimiston TSFs. Further storm water management systems, such as simple diversion trenches, will guide this storm water to suitable entry points in the catchment. A TSF closure Storm Water Integration Study (Golder, 2018) was undertaken to ensure that this storm water, which comprises 1.8% of the total catchment area, had no unfavourable impact on any downstream infrastructure such as roads or the rail line.

Post operations, a period of two to three years will be allowed to ensure the tailings are sufficiently dried out to allow safe access to the tailings beaches which form on the upper surface prior to commencement of rehabilitation earthworks. The tailings surface will be rock armoured with 0.5 m of benign material (i.e. rock or oxide waste), sourced from the Fimiston WRDs, which will protect the tailings surface against water or wind erosion.

A competent engineered and rock armoured perimeter crest bund will be built around the upper crest of the TSFs. Engineering assessment of the upper surface of the TSF has confirmed the design capacity of 12 hour PMP (Probable Maximum Precipitation, 723.5 mm), without the crest bund. Therefore, the crest bund will add additional capacity and ensure no overtopping to the external slopes.

Geophysical - TSF Draindown

Draindown monitoring and final sign off will be done by a TSF engineer. The key to reducing the timeframe is operation control of the pond size, which is currently managed through the Seepage and Groundwater Management Plans for the TSFs.

9.2.5.3.3 Seepage and Groundwater Management

Non-polluting – Minimise Sediment movement

The water management system of bench drains and downchutes for the Fimiston TSFs, have an allowance for energy dissipation structures, which will cause sediment to drop out at this point rather than in the wider environment.

Non-polluting – Seepage Management and Groundwater

Contaminated Sites legislation requires tailings facilities to be suitably capped with waste rock or other suitable materials.

Due to the saline nature of the groundwater, the only beneficial user of the groundwater is Mining/Mineral Processing. Seepage from the TSFs has a similar salinity signature, and therefore there is no material impact on the beneficial users.

The objective of current groundwater abstraction around the TSFs is to ensure that there is no significant harm to vegetation values in the vicinity of the TSFs (key environmental value). Post closure, this will remain the primary objective. Once tailings deposition ceases, and the TSFs have drained down, the seepage and groundwater recovery borefields will continue operating for an estimated period of approximately 10 years to maintain control of groundwater elevations until equilibrium is reached. Post closure of the Fimiston Processing Plant, abstracted seepage will be pumped to Fimiston Open Pit for disposal into the Fimiston pit lake.

Prior to closure, assumptions related to pumping periods will require refinement based on the actual operational tailings deposition schedule. Operational sequencing of tailings deposition over various paddocks will play a role in determining effect and timing of residual seepage rates from the facilities on groundwater elevations.

Temporary ponding of incident rainfall will occur on top of the closed TSFs. However, due to high potential evaporation and low rainfall in the area, it is expected this will be a short-term occurrence and as a result of de-saturation of the underlying tailings pile, will not result in any long term hydraulic connection between ponding on the TSF surface and the groundwater system below the facility. Some infiltration into the tailings from surface will occur, and in the long-term, ongoing seepage rates in the range of 2 to 5 L/s have been modelled to occur from each paddock into the underlying groundwater system for a period post closure. The modelling indicates that the groundwater elevation will not be influenced by this minor seepage.

Estimates for expected volumes have been developed by BigDog Geohydrology, and inputted into the pit lake model.

9.2.5.3.4 Sustainable Land use – Revegetation

Rehabilitation of the TSFs will include areas designated for topsoil spreading on the slopes. Some areas, such as the upper surfaces of the TSFs will not receive topsoil, as, on a site wide basis, there are insufficient resources. Topsoil and other growth media are scheduled to areas on site based on their visual amenity to the City of Kalgoorlie-Boulder. Usage of these limited resources cannot be viewed on a landform by landform basis,but must be planned and implemented on a site wide basis. Thus, the final distribution of these resources on WRDs and TSFs are interlinked.

9.2.5.4 Detailed TSF Design (Fimiston Operational Area TSFs)

The closure design for the three currently operational paddock TSFs and proposed Fimiston IIE and Fimiston III TSFs are conceptually similar, with the primary objective to ensure a safe and stable closure landform. The closure design criteria and designs were developed by a multi-skilled team, including KCGM tailings and closure staff, Golder's tailings engineers and other specialist consultants to preliminary level. Workshops and design work occurred during the period 2014 to 2017. The design studies (refer to Volume 3 (Appendix 5-6) for a design technical summary) included surface and slope hydrology, produced typical design cross-sections, bills of quantities and a cost estimation.

Some key considerations and implementation design details that are worth noting:

- All Fimiston TSFs are likely to remain active until late in mine life, due to operational tailings capacity requirements. Post operations, a period of two to three years will be allowed to ensure the tailings is sufficiently dried out to allow safe access to the tailings beaches which form on the upper surface prior to commencement of rehabilitation earthworks.
- A competent engineered and rock armoured perimeter crest bund (refer design in Appendix 5-6) will be constructed along the perimeter embankments at closure. There is sufficient capacity to retain the 24-hour probable maximum precipitation (PMP) storm event on the top surface of the TSF, however the bund will add additional capacity and ensure no overtopping to the external slopes. Engineering assessment of the upper surface of the TSF has confirmed the design capacity of 12 hour PMP (Probable Maximum Precipitation, 723.5 mm), without the crest bund.
- The tailings surface (beach) will be capped with up to 0.5 m of suitable material (waste rock or oxide) sourced from Fimiston WRDs, which will protect the surface against water and wind erosion by acting as an energy dissipater and forming a barrier on the tailings surface.
- The external embankment slopes (above the existing rehabilitated slopes) will be regraded to a constant gradient (~1V:4H) with the removal of step-in benches. In the case of Fimiston II TSF, this requires considerable dozer works due to the existing shape of the TSF. Adjustment to a bi-angled slope design is also required to achieve a design which meets all requirements. Kaltails and the proposed Fimiston IIE and Fimiston III TSFs require far less reshaping works as the operational design has aligned with the closure design, as an outcome of the closure design project.
- Erosion modelling indicates rock armouring required at nominal thickness of 0.5 m to minimise the potential for water erosion of the tailings and minimise wind erosion (dust generation).
- The outer surface designs will be similar to the erosion resistant design used for the Fimiston WRDs, with rocky bands placed at key locations to manage water erosion. The specific location of the rocky bands will be determined on a case by case basis for each flank, based on a number of factors, including slope lengths, actual TSF wall geometry and practical implementation aspects. Modelling indicates that rocky bands will be required more frequently at Fimiston I due to the rehabilitation material properties. The erosion resistant design will also assist with reducing infiltration of rainwater to the interface between the capping material and the TSF surface.
- Where they exist, the large mid-slope benches above the existing lower rehabilitated slopes for Fimiston I, Fimiston II and Kaltails TSFs, will be retained as bench drains with downchutes (refer design in Appendix 5-6) to convey storm runoff generated from the upper slopes to ground level. Energy dissipation structures and channels at the toe of the downchutes will be designed to manage hydraulic energy dissipation potential and direct rainfall runoff into the natural environment. Modelling, as part of the TSF design studies, has verified that runoff from the closed TSFs can be accommodated through existing rail line culverts with no impact to downstream users.
- Further stormwater management systems such as simple diversion trenches will guide stormwater water to suitable entry points in the catchment. A TSF closure Storm Water Integration Study (Golder, 2018; Appendix 5.6), as part of the closure design studies, has been completed to confirm that stormwater from the TSFs, which comprises 1.8% of the total catchment area, will have no unfavourable impact on any downstream infrastructure such as roads or the rail line.
- The blanket toe drains around the perimeter of TSF impoundments will remain in place and will continue to recover seepage water until no longer required. Seepage from production bores will be pumped to the Fimiston Open Pit once the Fimiston Plant is no longer operational; this water has been taken into account

when modelling the Fimiston Open Pit closure pit lake. All tailings pipelines and pump stations will be flushed prior to decommissioning of systems and tailings lines, and pumps will be removed.

- On existing older Fimiston TSFs rehabilitation has been completed on the lower flanks and will be retained. Sections of the TSF embankments have been buttressed with waste rock, with this practice likely to continue to manage geotechnical requirements. Buttress material will not be rehabilitated, as this would influence the position of the weight on the TSF embankment.
- In the post closure period, the TSF areas are likely to be designated as zones of restricted access for a period of time, as well as to protect established vegetation. The TSFs are currently surrounded by a fence.

Table 9-29 provides the closure and rehabilitation design criteria that have been developed for Fimiston TSFs (Golder, 2018b, in RegID 75568).

Table 9-29: Closure and rehabilitation design criteria for Fimiston TSFs

FACTOR	CLOSURE AND REHABILITATION DESIGN CRITERIA
TSF Top (Beach) Surface	
Top Surface Geometry (Per Paddock/Cell)	Interior drainage with an engineered perimeter bund designed to provide internal containment for the design storm. If not in place, due to the existing beach slope, the outermost 75 m of the top surface perimeter area will be graded to drain away from the outer slopes to promote rainfall runoff flowing away from the perimeter.
Top Surface Cover and Thickness	Nominally 0.5 m thick benign waste rock or oxide waste placed as a single loose lift over tailings.
Perimeter Bund	Minimum crest width of 1.5 m with slopes 1V:3H. Minimum height to be designed to provide stable containment for the design storm (24-hour PMP) plus 0.3 m freeboard. Bunds to be constructed with low permeability soils (e.g. tailings) and protected from erosion with rock armour.
Perimeter Bund Construction	Low permeability soil or tailings placed in perimeter bunds to be placed in maximum 0.3 m lifts and compacted to a minimum dry density of 95% of the maximum dry density, as determined by AS1289.5.4.1, at a moisture content of ±2% of the optimum moisture content. This is consistent with construction of wall raises. The cover material to be placed over the compacted perimeter bund.
Embankment Slopes	
Existing Lower Embankment Slopes	Retain existing rehabilitation completed on lower embankment slopes; retain, unchanged or reshaped, existing and future buttressing on lower embankment slopes
Embankment Slope Profile	Regrade where required to a nominal 1V:3H continuous or dual slope if currently steeper than 1V:3H, or a continuous slope to meet cut to fill requirements. To be assessed individually for each TSF flank.
Embankment Slope Closure and Rehabilitation Cover	0.5 m thick cover of benign waste rock placed over compacted tailings. Growth media placement in alignment with KCGM Visual Amenity Concept, with placement of 150 to 200 mm of rehabilitation materials ripped into the waste rock prior to seeding. Rocky bands to be placed based on rehabilitation material properties and TSF flank specific assessment. No topsoil is available for the upper sections of the Kaltails TSF.
Buttress material	Retention of buttress material in geotechnically correct position.
Toe Sediment Retention Bund	Conversion of the seepage recovery drain and bund to sediment retention structure. Minimum crest width 2 m, height 2 m and outer bund slopes 1V:4H.
Hydrology	
Rehabilitation and Closure Strategy	Contain precipitation from the design containment storm event on the top surface.
Design Storm for Containment	24-hour probable maximum precipitation (PMP) event for upper surface.
Design Storm for Conveyance (downchute and stilling basin)	Capable of managing the 500-year annual recurrence interval (ARI) event.

9.2.5.4.1 Fimiston I TSF

The lower northern embankment of Fimiston I TSF has been rehabilitated in the early 2000's, but has experienced damage due to wind blown tailings. The NW and western lower embankments were rehabilitated, but the slope angle is too steep for the material characteristics. The Northern and NW lower embankments have been covered with a buttress in 2022. Topsoil was tested and recovered where worthwhile for reuse. Several groundwater management bores and a road are sited within the toe of steep NW and western rehabilitated slope area, making it difficult to implement further remedial work prior to these bores no longer being in use. Upper slopes can be rehabilitated during operations.

Post operations, a period of two to three years will be allowed to ensure the tailings is sufficiently dried out to allow safe access to the tailings beaches which form on the upper surface prior to commencement of rehabilitation earthworks. Figure 9-31 and Figure 9-32 illustrate the closure design for the Fimiston I TSF.

After a drying out period, the tailings surface will be capped with up to 0.5 m of suitable material (waste rock or oxide) sourced from adjacent Fimiston WRDs, which will protect the surface against water and wind erosion by acting as an energy dissipater and forming a barrier on the tailings surface.

A competent engineered and rock armoured perimeter crest bund will be built around the upper crest of the TSFs. Engineering assessment of the upper surface of the TSF has confirmed the design capacity of 12 hour PMP (Probable Maximum Precipitation, 723.5 mm), without the crest bund. The bund will add additional capacity and ensure no overtopping to the external slopes.

On the eastern side, the lower flank has been rehabilitated, with a wide bench above the completed rehabilitation. Stormwater from this bench drain will be diverted to ground level through an engineered downchute, consistent with existing practice on the Fimiston TSFs, and a simple diversion trench to guide this stormwater water to a suitable entry point in the catchment. The entry point will be on the west side of the rail line and is not expected to have an impact on any third party infrastructure.

Two sides (western and southern) of the TSF will be encapsulated by WRDs by closure. The remaining slopes will be rehabilitated to form a single continuous slope, as this is deemed to be the best option from an erosion management perspective. A waste rock cover will be placed on the external embankments to minimise the potential for water erosion of the tailings used, and to minimise wind erosion (dust generation). The thickness of the rock cover being considered is nominally 0.5 m. The outer surface designs will be similar to the erosion resistant design used for the Fimiston WRDs, with rocky bands to be placed at key locations to manage water erosion. The specific location of the rocky bands will be determined on a case by case basis for each flank, based on a number of factors, including slope lengths, TSF wall geometry and practical implementation aspects. Modelling indicates that rocky bands will be required more frequently at Fimiston I due to the stockpiled rehabilitation material erodibility properties. The erosion resistant design will also assist with reducing infiltration of rainwater to the interface between the capping material and the TSF surface. Buttress material on the TSF will not be reshaped, as the weight loading on the TSF walls cannot be altered.

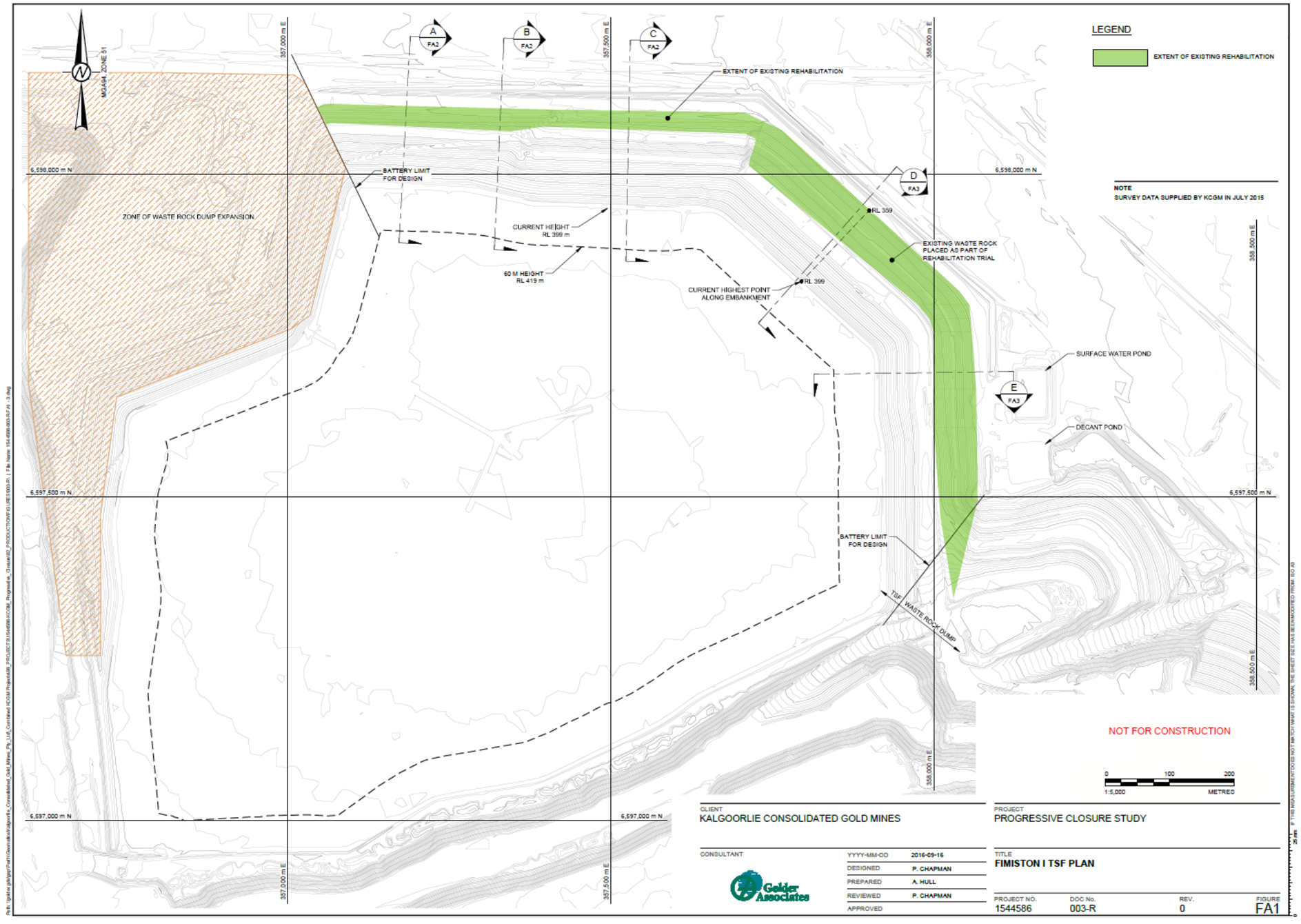


Figure 9-31: Fimiston I TSF Closure Design*

** Note: design work undertaken prior to buttressing; Buttressing does not impact designs.*

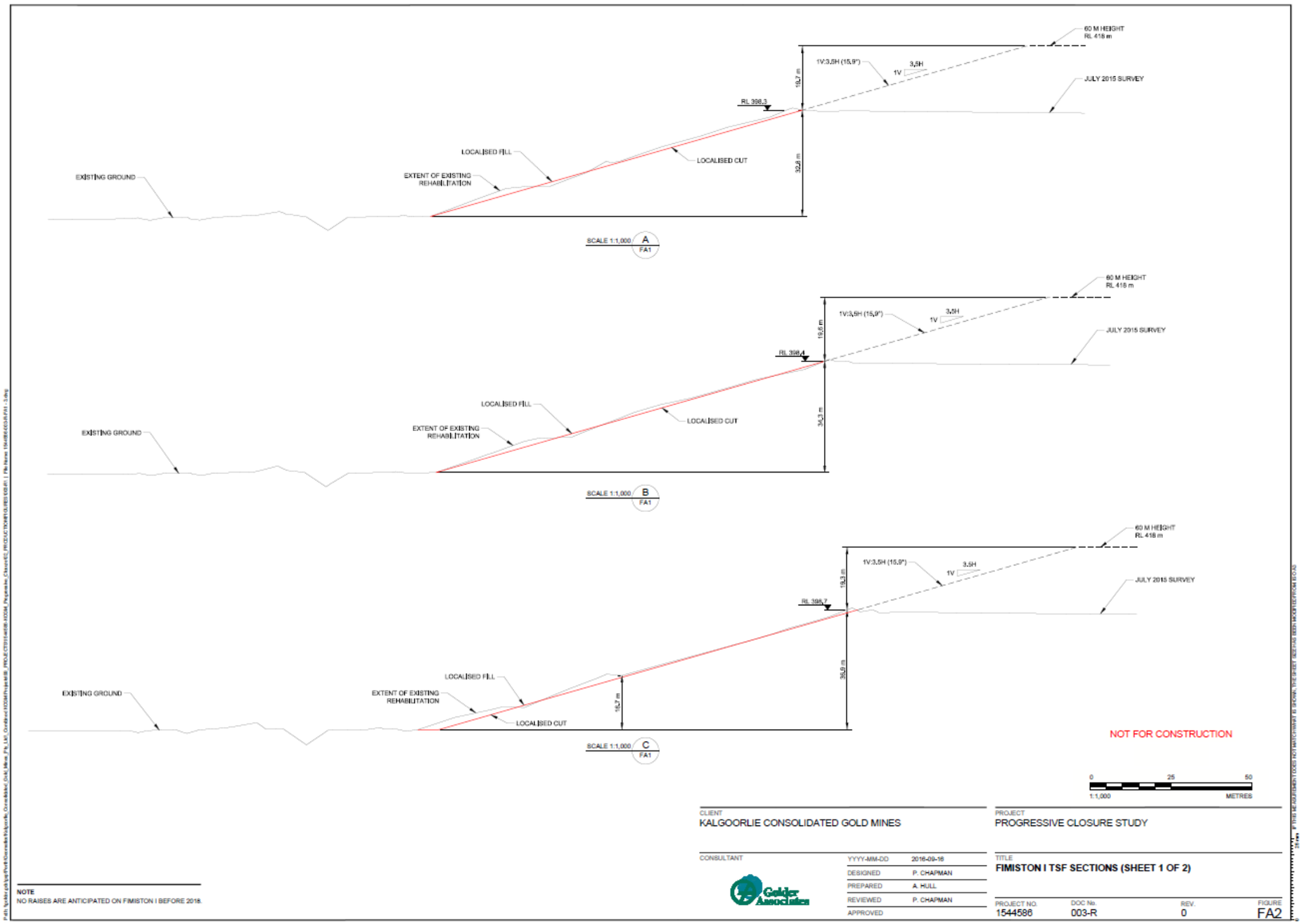


Figure 9-32: Fimiston I Closure Design Cross Sections

9.2.5.4.2 Fimiston II TSF

The lower embankment slopes of Fimiston II TSF were rehabilitated in the early 2000's, and are considered complete. Upper embankment slopes are being rehabilitated during operations (2018 ongoing). Figure 9-33 and Figure 9-34 illustrate the closure design for the Fimiston II TSF.

Post operations, a period of two to three years will be allowed to ensure the tailings is sufficiently dried out to allow safe access to the tailings beaches which form on the upper surface prior to commencement of rehabilitation earthworks. After a drying out period, the tailings surface will be capped with up to 0.5 m of suitable material (waste rock or oxide) sourced from Fimiston WRDs, which will protect the surface against water and wind erosion by acting as an energy dissipater and forming a barrier on the tailings surface. Rainfall events will result in temporary ponding of incident rainfall on top of the TSF; due to high potential evaporation and low rainfall in the area, it is expected this will be a short- term occurrence. As a result of de-saturation of the underlying tailings pile, this will not result in any long term hydraulic connection between ponding on the TSF surface and the groundwater system below the facility. Some infiltration into the tailings from surface will occur, and in the long term, ongoing seepage rates in the range of 2 to 5 L/s have been modelled to occur from each paddock into the underlying groundwater system. The modelling indicates that the groundwater elevation will not be influenced by this minor seepage.

A competent engineered and rock armoured perimeter crest bund will be built around the upper crest of the TSFs. Engineering assessment of the upper surface of the TSF has confirmed the design capacity of 24 hour PMP (Probable Maximum Precipitation, 723.5 mm), without the crest bund. The bund will add additional capacity and ensure no overtopping to the external slopes.

The lower flanks of Fimiston II have been rehabilitated, with a substantial step in bench above the rehabilitated flanks. Stormwater from this bench drain will be diverted to ground level through a downchute, consistent with existing practice on the Fimiston TSFs. If required, further stormwater management systems, such as simple diversion trenches, will guide this stormwater water to suitable entry points in the catchment. A study has been completed to ensure that this stormwater from the TSFs, which comprises 1.8% of the total catchment area, which has confirmed that this action will have no unfavourable impacts on any downstream infrastructure such as roads.

The remaining slopes will be rehabilitated to form a dual angle continuous slope, as this is deemed to be the best design fit to the existing slopes. A rocky band will be placed at the inflection point - the angle change - to manage water erosion on the slope. As the design has been implemented, an additional rocky bank has been added lower down the slope above the rehabilitation bench. The design will continue to be adjusted to include improvements based on implementation learnings. A waste rock cover will be placed on the external embankments to minimise the potential for water erosion of the tailings used, and to minimise wind erosion (dust generation). The thickness of the rock cover is nominally 0.5 m. The outer surface designs will be similar to the erosion resistant design used for the Fimiston WRDs, with rocky bands placed at key locations to manage water erosion. The specific location of the rocky bands will be determined on a case by case basis for each flank, based on a number of factors, including slope lengths, current TSF wall geometry and practical implementation aspects. Modelling indicates that rocky bands can be spaced further apart for the rehabilitation materials available at Fimiston II (as compared to Fimiston I). The erosion resistant design will also assist with reducing infiltration of rainwater to the interface between the capping material and the TSF surface.

Buttress material on the TSF will not be reshaped, as the weight loading on the TSF walls cannot be altered. The blanket toe drains around the perimeter of TSF impoundments will remain in place in the initial post closure period and will continue to recover seepage water, which will be pumped to the Fimiston Open Pit once the Fimiston Plant is no longer operational. All tailings pipelines and pump stations will be flushed prior to decommissioning of systems and tailings lines and pumps will be removed.

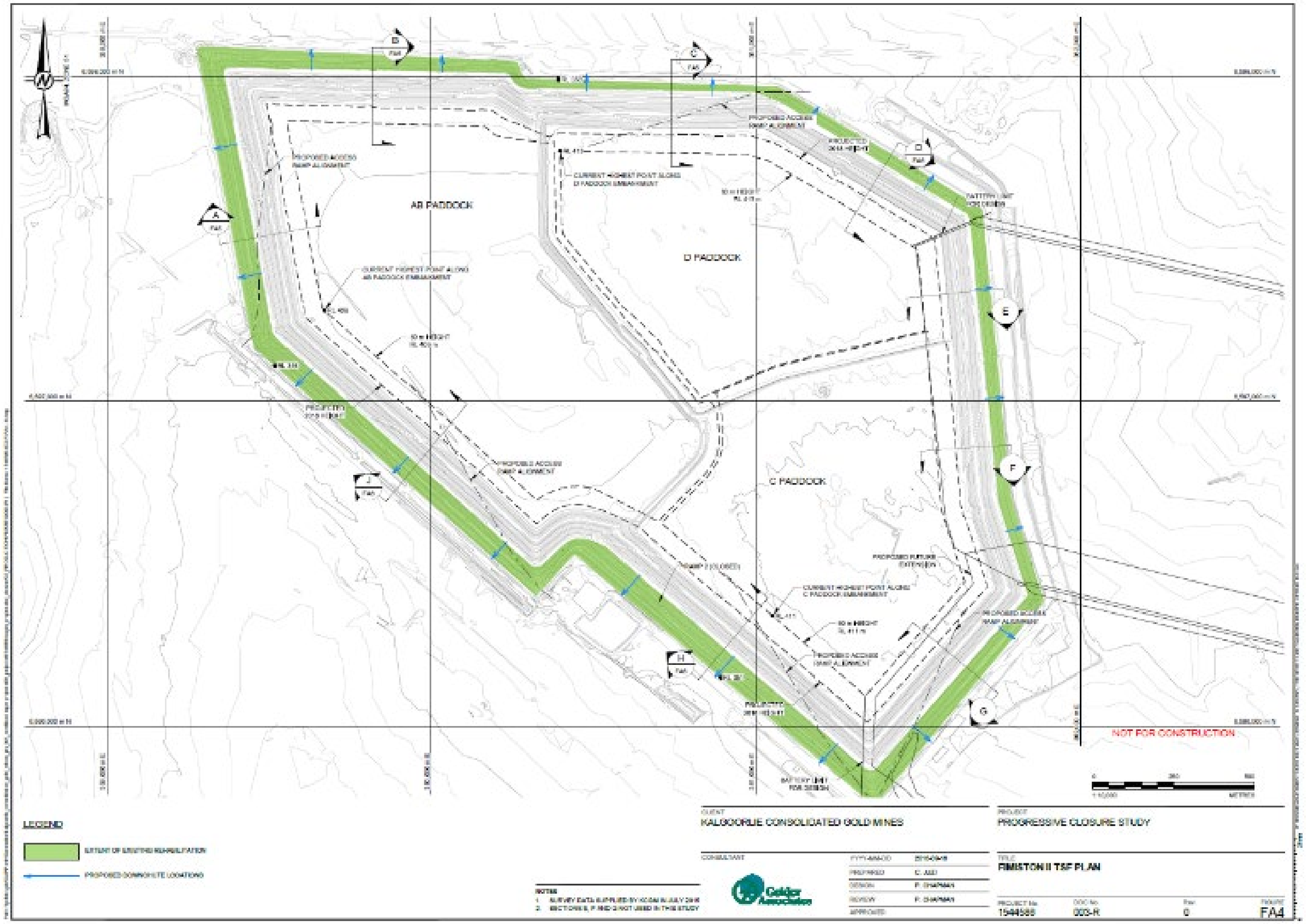


Figure 9-33: Fimiston II TSF Closure Design

** Note: design work undertaken prior to buttressing; Buttressing does not impact designs.*

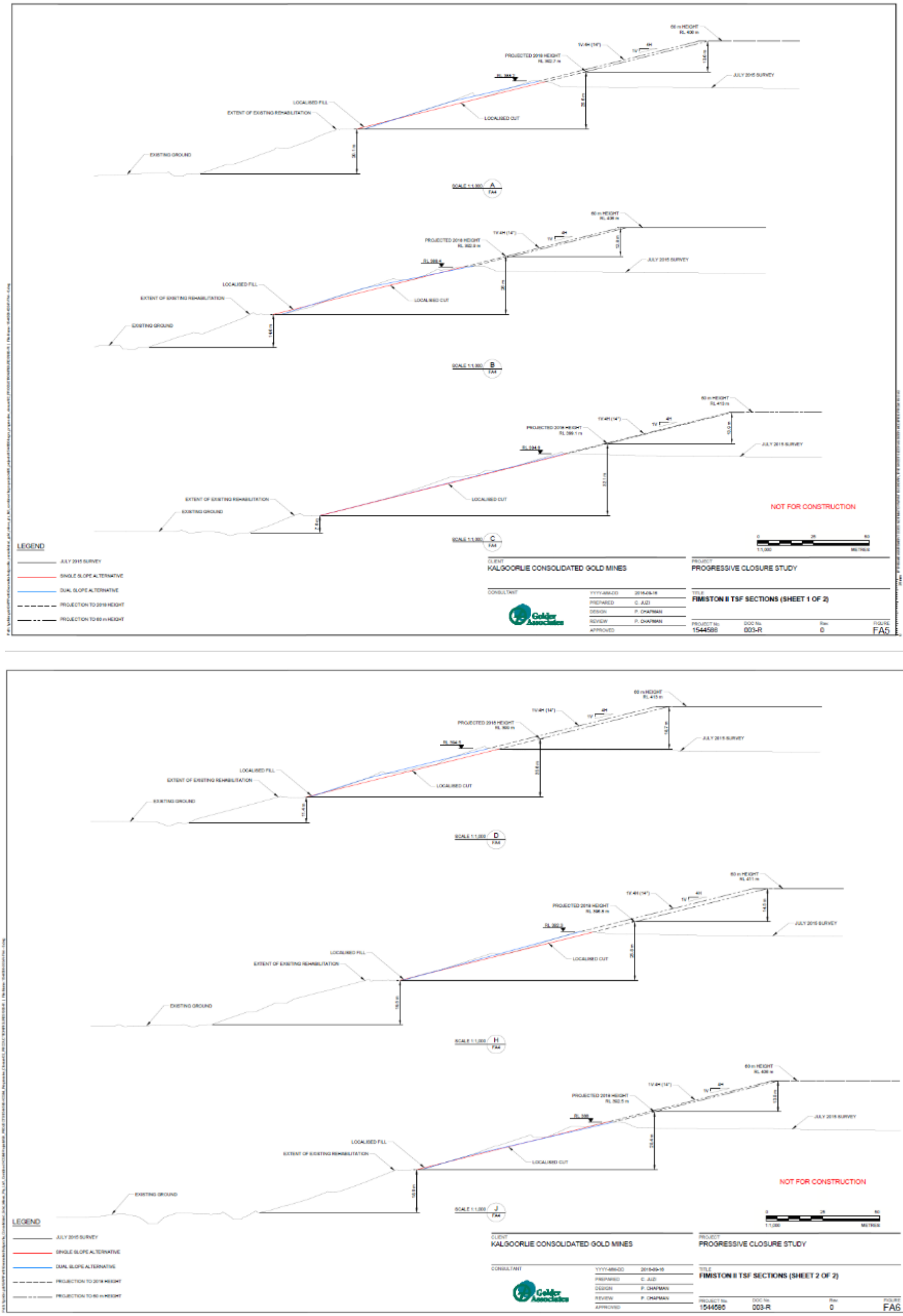


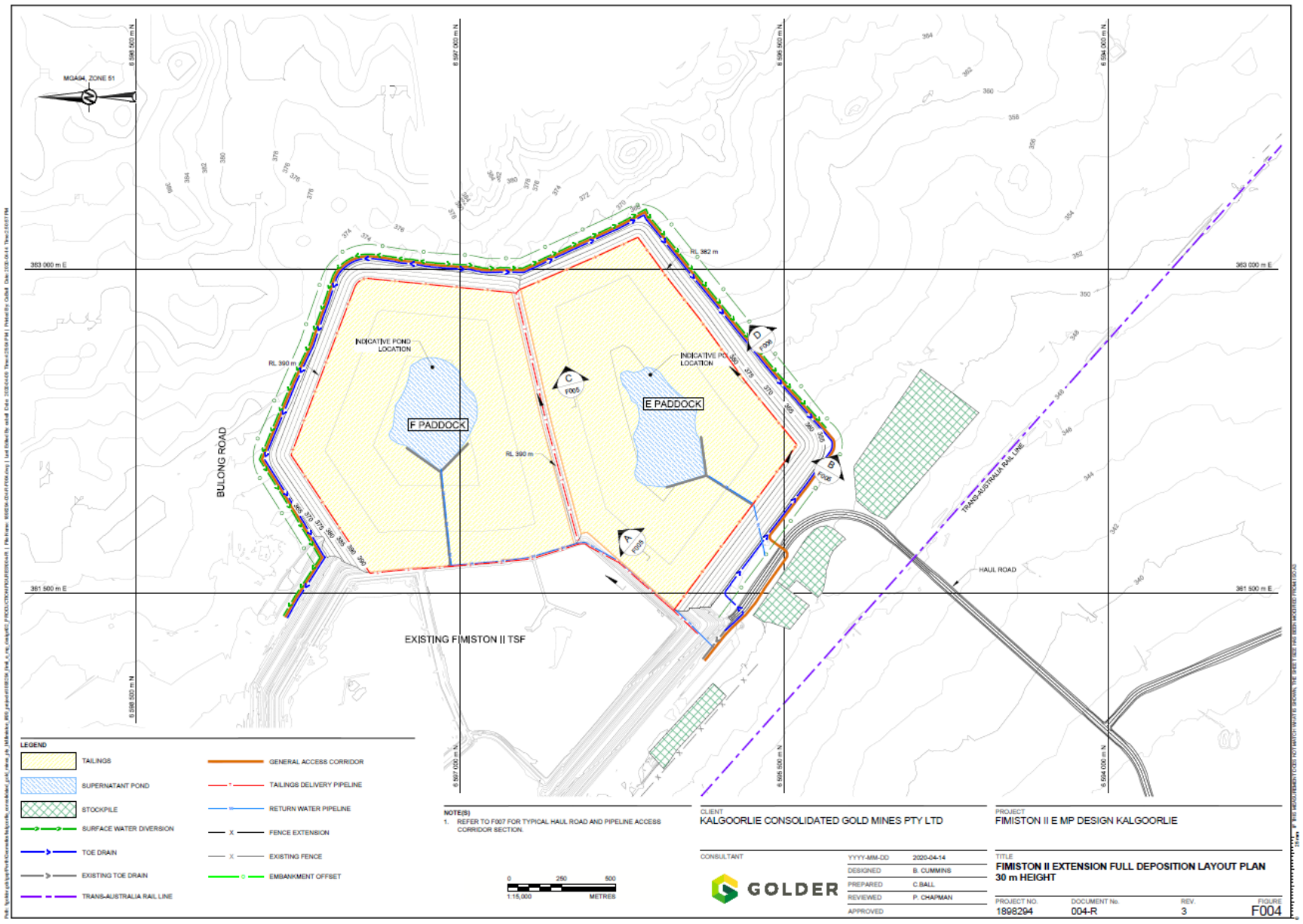
Figure 9-34: Fimiston II TSF Closure Design Cross Sections

9.2.5.4.3 Fimiston IIE TSF

The Fimiston IIE TSF has been designed with linear slopes, and the closure design will essentially be the same as for the other Fimiston TSF. The embankment slopes will be rehabilitated to form a single continuous slope, as this is deemed to be the best option from an erosion management perspective. A waste rock cover will be placed on the external embankments to minimise the potential for water erosion of the tailings used, and to minimise wind erosion (dust generation). The thickness of the rock cover will be nominally 0.5 m. Topsoil will be placed on the embankment slopes and ripped and seeded. Should buttress material be placed on the TSF slopes, this material will not be reshaped as the weight loading on the TSF walls cannot be altered. The design parameters detailed in Table 9-29 are applicable to Fimiston IIE TSF. Fimiston IIE is expected to have linear slopes aligned with the closure design. Like Fimiston I TSF, Fimiston IIE TSF may need more frequent rocky bands to the anticipated erosion properties of the topsoil to be cleared from the footprint.

Post operations, a period of two to three years will be allowed to ensure the tailings is sufficiently dried out to allow safe access to the tailings beaches which form on the upper surface prior to commencement of rehabilitation earthworks. After a drying out period, the tailings surface will be capped with up to 0.5 m of suitable material (waste rock or oxide) sourced from Fimiston WRDs, which will protect the surface against water and wind erosion by acting as an energy dissipater and forming a barrier on the tailings surface. Incident rainfall on the facility will result in temporary ponding on top of the TSF; due to high potential evaporation and low rainfall in the area, it is expected this will be a short- term occurrence and, as a result of de-saturation of the underlying tailings pile, will not result in any long term hydraulic connection between ponding on the TSF surface and the groundwater system below the facility.

A competent engineered and rock armoured perimeter crest bund will be built around the upper crest of the TSFs. Engineering assessment of the upper surface of the TSF has confirmed the design capacity of 12 hour PMP (Probable Maximum Precipitation, 723.5 mm), without the crest bund. The bund will add additional capacity and ensure no overtopping to the external slopes. The blanket toe drains around the perimeter of TSF impoundments will remain in place in the initial post closure period and will continue to recover seepage water, which will be pumped to the Fimiston Open Pit once the Fimiston Plant is no longer operational. All tailings pipelines and pump stations will be flushed prior to decommissioning of systems and tailings lines and pumps will be removed.



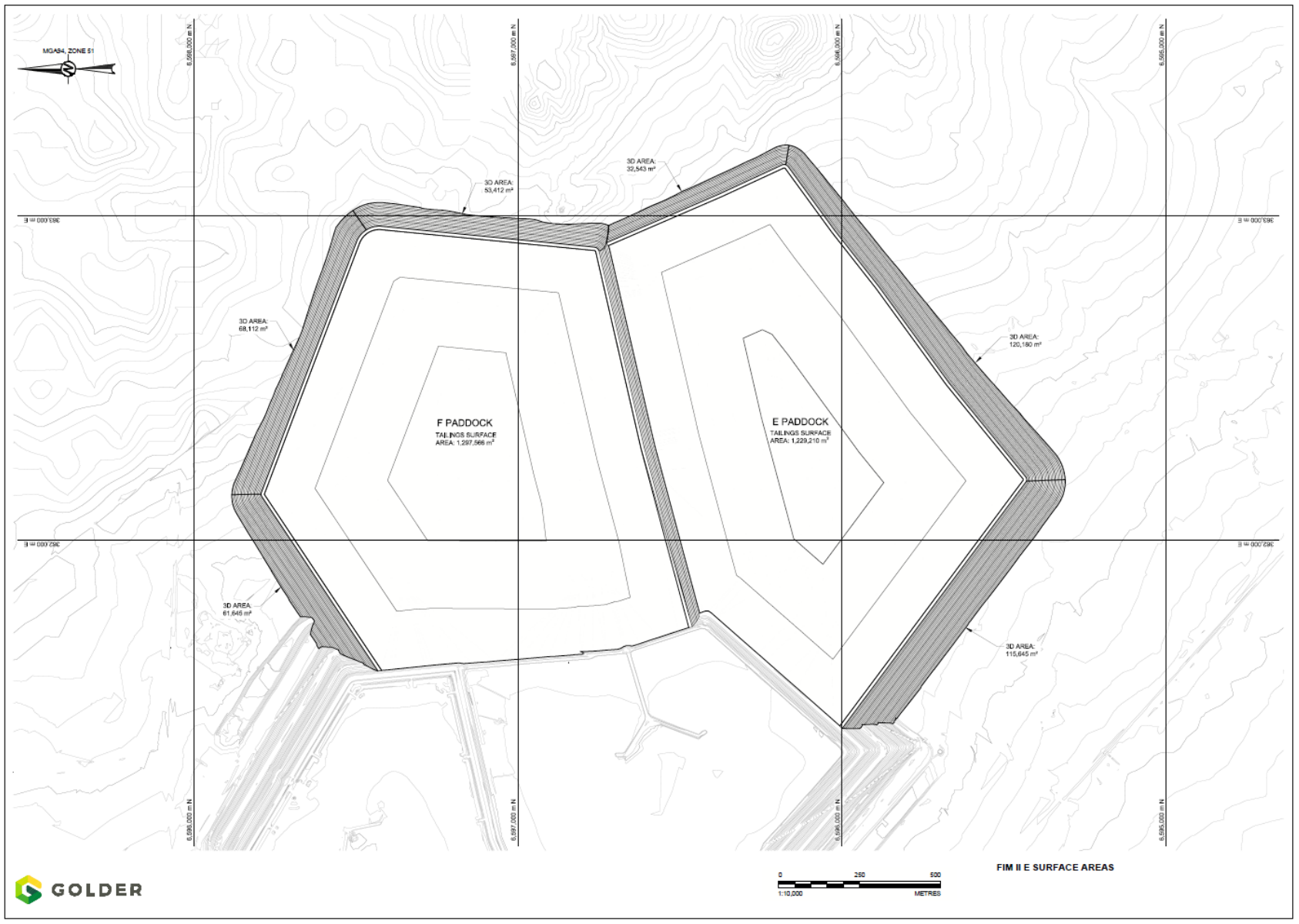


Figure 9-35: Fimiston IIE TSF Operational Layout (top) and Closure Design (bottom)

9.2.5.4.4 Kaltails TSF

The lower slopes of Kaltails TSF were rehabilitated by the previous owners (Kaltails Retreatment State Agreement), and are considered complete. Upper embankment slopes can be rehabilitated during operations, with works implemented on the northern flank of Kaltails East in 2020/21. Figure 9-36 and Figure 9-37 illustrate the closure design for the Kaltails TSF.

Post operations, a period of two to three years will be allowed to ensure the tailings is sufficiently dried out to allow safe access to the tailings beaches which form on the upper surface prior to commencement of rehabilitation earthworks. After a drying out period, the tailings surface will be capped with up to 0.5 m of suitable material (waste rock or oxide) sourced from Fimiston WRDs, which will protect the surface against water and wind erosion by acting as an energy dissipater and forming a barrier on the tailings surface. Incident rainfall on the facility will result in temporary ponding on top of the TSF; due to high potential evaporation and low rainfall in the area, it is expected this will be a short- term occurrence and as a result of de-saturation of the underlying tailings pile, will not result in any long term hydraulic connection between ponding on the TSF surface and the groundwater system below the facility. Some infiltration into the tailings from surface will occur, and in the long term, ongoing seepage rates in the range of 2 to 5 L/s have been modelled to occur from each paddock into the underlying groundwater system. The modelling indicates that the groundwater elevation will not be influenced by this minor seepage.

A competent engineered and rock armoured perimeter crest bund will be built around the upper crest of the TSFs. Engineering assessment of the upper surface of the TSF has confirmed the design capacity of 12 hour PMP (Probable Maximum Precipitation, 723.5 mm), without the crest bund. The bund will add additional capacity and ensure no overtopping to the external slopes.

The remaining upper slopes will be rehabilitated to form a single continuous slope, as this is deemed to be the best option from an erosion management perspective. A waste rock cover will be placed on the external embankments to minimise the potential for water erosion of the tailings used, and to minimise wind erosion (dust generation). The thickness of the rock cover will be nominally 0.5 m. The approved outer surface design for the upper Kaltails slopes is a rock only finish, due to no rehabilitation material resources being available at Kaltails (all materials were used for the lower bench rehabilitation). Buttress material on the TSF will not be reshaped, as the weight loading on the TSF walls cannot be altered.

The lower flanks of Kaltails were rehabilitated by the previous owners, with a substantial step in bench above the rehabilitated flanks. Stormwater from this bench drain will be diverted to ground level through downchutes, consistent with existing practice on the Fimiston TSFs. If required, further stormwater management systems such as simple diversion trenches will guide this stormwater water to suitable entry points in the catchment. A study has been completed to ensure that this stormwater from the TSFs, which comprises 1.8% of the total catchment area, this has confirmed that there will be no unfavourable impact on any downstream infrastructure such as roads.

The blanket toe drains around the perimeter of TSF impoundments will remain in place in the initial post closure period and will continue to recover seepage water, which will be pumped to the Fimiston Open Pit once the Fimiston Plant is no longer operational. All tailings pipelines and pump stations will be flushed prior to decommissioning of systems and tailings lines and pumps will be removed.

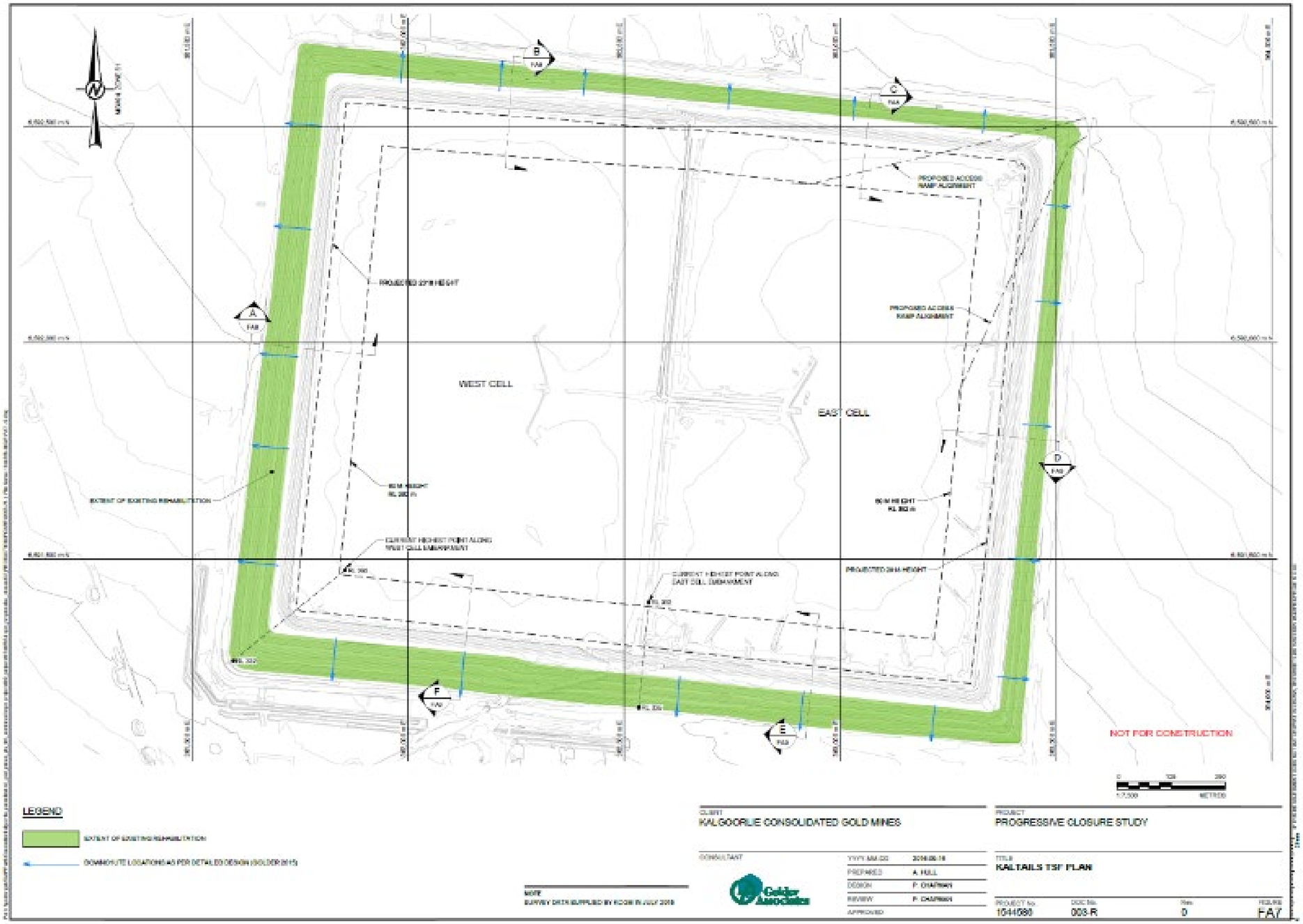
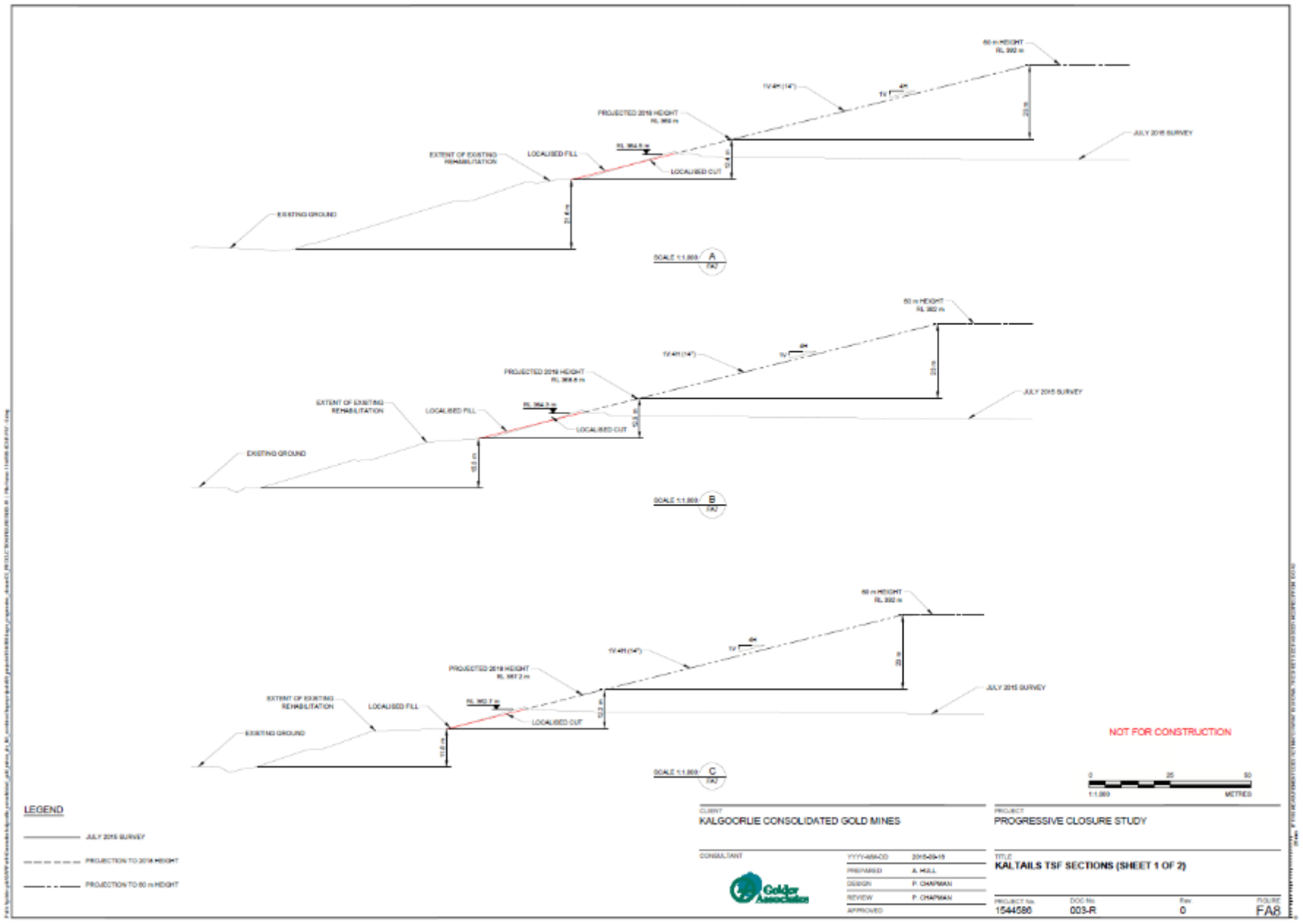


Figure 9-36: Kaltails TSF Closure Design

** Note: design work undertaken prior to buttressing; Buttressing does not impact designs.*



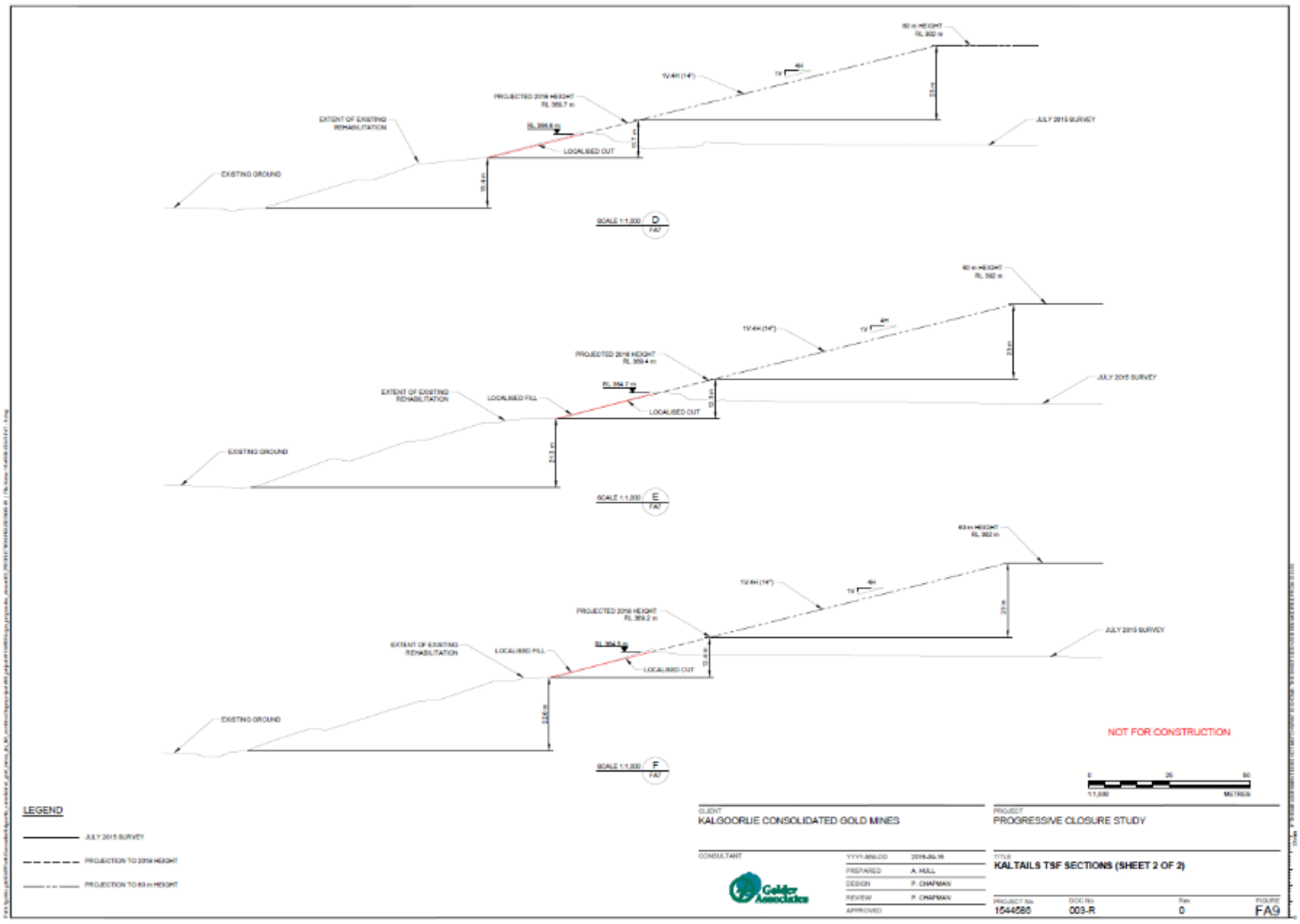


Figure 9-37: Kaltails TSF Closure Design Cross Sections

9.2.5.4.5 Fimiston III TSF

The Fimiston III TSF design is still at a conceptual stage.

The following basis of design have been developed to date:

- Capacity in the order of 414 tonnes of tailings and likely to come on line post 2026;
- The TSF will have underdrainage collection systems similar to those to be installed at Fim IIE TSF;
- Tailings characteristics and deposition criteria will be the same as for existing Fimiston TSFs;
- Embankment designs will be consistent with existing designs for other Fimiston TSFs and will be aligned with the closure design requirements;
- The exact dimensions of the TSF are not finalized. The most likely design is a 3 cell arrangement to 45m height;
- Groundwater management will be the same as for existing and other proposed Fimiston TSFs, namely using a Seepage and Groundwater Management Plan, most likely with identical groundwater targets as successfully implemented for Fimiston II TSF; and
- The closure designs will be consistent with the existing Fimiston TSF closure designs.

9.2.5.5 Rehabilitation Materials for Fimiston Operational Area

Growth media resources for Fimiston Operational Area cannot be viewed in isolation or per landform / landform type due to a shortage of rehabilitation materials. For TSF rehabilitation, the embankment slopes will be capped with competent waste rock sourced from allocation material in Eastern WRD, and topsoiled using topsoil available at the TSFs (except in the case of Kaltails). The upper surfaces of the TSFs will be capped with waste rock or oxide/ rock blend. There is more than sufficient waste rock and oxide resources available at Eastern WRD (Fimiston II, IIE, III and Kaltails TSFs) and at Northern WRD (Fimiston I TSF) for this capping.

Table 9-30: Fimiston TSF Waste Rock Capping Materials Balance

Waste Rock or Oxide requirements for rehabilitation of Fimiston TSFs			
TSF		Waste rock m^3	Waste rock or oxide m3
Fimiston I	Embankment slopes	264,072	
	Upper surface		462,893
	Other	81,507	
Fimiston II	Embankment slopes	981,395	
	Upper surface		1,267,840
	Other	257,912	
Kaltails	Embankment slopes	699,563	
	Upper surface		721,254
	Other	189,841	
Fimiston IIE (3 cell)	Embankment slopes	3,278,200	
	Upper surface		2,273,537
	Other (estimate)	300,000	
Fimiston III	Embankment slopes	1,248,078	
	Upper surface		1,768,428
	Other (estimate)	300,000	
Total Required		**7,600,568**	**6,493,952**
10% allowance for oversize		760,057	649,395
10% allowance for compaction into TSF slope		760,057	649,395
Required amount to be stockpiled at Eastern WRD		**8,775,103**	**5,561,421**
Required amount to be stockpiled at Northern WRD		**290,479**	**462,893**

9.2.5.5.1 Application of Visual Amenity Concept

The following discussion relates to site wide allocation of growth media resources as well as TSF rehabilitation.

Growth media resources at Fimiston Operational Area are in short supply. Usage of materials has to be optimised. To provide a framework for decisions related to scheduling material for rehabilitation, the visual amenity concept was developed. Areas on WRDs, and to a certain extent on TSFs, are given a rating based on visibility from the City of Kalgoorlie-Boulder. Visual Amenity 1 areas are located on the western side of Fimiston Operational Area, and are highly visible to the City. Visual Amenity impact decreases in an eastern direction, with the areas furthest away and least visible ie the eastern slopes and all the flats of the WRD, given the lowest rating of VA4 (refer to Figure 9-24) showing the VA area distribution for Fimiston WRDs. Within each VA area, topsoil is prioritised to slopes, and Class D or oxide materials are used for Flat areas.

The Fimiston TSFs are generally located on the eastern side of the Fimiston Operational Area, close to secondary roads, and not visible from Kalgoorlie-Boulder. The Visual Amenity Concept acknowledges that rehabilitation materials are a finite resource and their usage needs to be optimised (i.e. lower quality materials will be allocated to areas which are less visible to the public, and conversely, higher quality materials to areas which are very visible to

the public). Figure 9-24 shows the TSFs as low visual amenity locations, implying that they should receive topsoil after other areas. However, topsoil will enhance the geotechnical stability requirements.

The key consideration for closure design of the TSFs is geotechnical stability and prevention of erosion on the outer embankments of the landform. The TSF design, requires the addition of some soil to the outer rock cover to retain any direct incident rainfall within the cover, preventing or reducing infiltration to the underlying tailings material interface where erosion is undesirable and would result in undercutting of material. Soil therefore forms a key component of the engineering closure design for TSF outer embankments.

9.2.5.5.2 Available Rehabilitation Resources

The existing growth media resources at Fimiston Operational Area are classified by their soil properties. The classification system is described in detail in Section 5.1.4.1 in Vol 1. In general, Class A, B and C are suited for slope rehabilitation. The majority of the Class D materials are not suitable for slopes (small volumes of subsoil Class D materials may be suitable for slopes).

When both the soil classification and visual amenity concept are combined, availability of rehabilitation resources and requirements can be calculated. Due to shortages, growth media resources must be assessed on a site wide basis. A summary is provided in Table 9-15, which describes quantities available and quantities required at both the WRDs and TSFs. The lower half of the table provides 3 scenarios, with a material balance for each. The most likely outcome is that there are sufficient site wide resources for growth media for VA 1 to VA 3, and enough resources for approximately 25% to 50% of VA4 to receive growth media.

Table 9-31: Fimiston Growth Media Materials Balance

WRDs	Volume growth media (m3) Material suitable for Flat areas	Material suitable for Slope areas	TSFs	Volume growth media (m3) Material suitable for Flat areas	Material suitable for Slope areas	Fimiston Whole of Site Growth Media Balance Material Balance for Flat areas	Material Balance for Slopes areas
Current Fimiston WRD requirements	1,501,720	1,858,820	Current Fimiston TSF requirements		485,270		
Change due to new Trafalgar WRD design	-	-	Fim IIE 3 cell requirements		323,479		
Forecast future WRD requirements	200,000	162,387	Forecast future TSF requirements (estimate, Fim III)		300,000		
Total required WRDs	**1,701,720**	**2,021,207**	**Total required TSFs**		**1,108,749**		
Growth media available in current WRD stockpiles	1,378,086	977,401	Growth media available in current TSF stockpiles		880,900		
Growth media recovered from Trafalgar WRD prior to implementation of new design	56,500	13,500	Growth media forecast from Fim IIE footprint	336,000	1,554,372		
Growth media forecast available in WRD stockpiles	**1,434,586**	**990,901**	**Growth media forecast available in TSFs stockpiles**	**336,000**	**2,435,272**		
Total required for WRDs			**Total required for TSFs**		**808,748**		
Scenario 1: whole of WRD has growth	1,701,720	2,021,207					
Shortfall for Scenario 1	- 267,134	- 1,030,306	Excess at TSFs	336,000	745,624	68,866	- 284,683
Scenario 2: 25% of VA4 has growth me	1,701,720	1,831,912					
Shortfall for Scenario 2	- 267,134	- 841,011	Excess at TSFs	336,000	745,624	68,866	- 95,387
Scenario 3: 50% of VA4 has growth me	1,701,720	1,737,264					
Shortfall for Scenario 3	- 267,134	- 746,363	Excess at TSFs	336,000	745,624	68,866	- 740

Assumptions: flat areas rehabiltated with poorer quality soils such as Class D/oxides
Visual Amenity concept is implemented to optimise use of available resources

Assumptions: top of TSFs capped with WRD or pit oxide
Upper embankments of Kaltails have no growth media, as per approvals

Overall balance for Scenarios
Current designs and available growth media allow for approx. 25% of VA4 areas to have growth media

9.2.5.6 Knowledge Gaps

With closure designs for the Fimiston TSFs completed, and implementation commenced, there are no large knowledge gaps for Fimiston TSFs. As buttresses have been constructed in various locations to manage the FoS, and may continue to be constructed closer to end of LOM, the water management structures for the TSFs will require a re-evaluation as they were designed prior to buttressing. Adjustments to final location of downchutes will have to be made to allow for buttress locations. It is best if this is done towards the end of operational life (single re-evaluation).

9.2.5.7 TSF Closure Implementation Status

Rehabilitation of the lower TSF embankment slopes has already been completed in a campaign in the early 2000s. Further rehabilitation of the TSF embankment slopes is being conducted progressively, commencing in 2019. Detailed design of TSF flanks is done immediately prior to implementation by mine planning engineers, using geotechnical guidance for the Engineer on Record. The designs are specific to the TSF flank shape (as built) and scheduled rehabilitation materials. Learning from completed works will continue to be incorporated into implementation level designs.

9.2.5.7.1 Completed Closure Tasks and Studies

For scheduling details on Tasks please refer to Section 9.7.

Table 9-32: Completed Closure Tasks and Studies for Fimiston TSFs

TASK	TARGET COMPLETION DATE/PERIOD
TSF Closure Planning Strategy	Strategy completed; Implementation in progress.
Refine Visual Amenity concept related to TSFs	2018 MCP; completed
Review of Materials Classification System (erodibility focus)	**Completed**; further refinements may occur
Update Materials Balance Inventory/Rehabilitation Material Reconciliation	**Completed**; further updates may be required.
Review of rehabilitation monitoring programme	**Completed**; Field trial work and studies to link with proposed completion criteria underway for past 2-3 years
Refine acceptable completion criteria	**Completed for MCP 21**; further refinements may occur
Material characterisation studies (TSF material)	**Completed**
Groundwater management strategies (part of TSF Decommissioning Plan	Draft Groundwater Completion Criteria study

9.2.5.7.2 Planned Closure Tasks and Studies

For scheduling details on Tasks please refer to Section 9.7.

Table 9-33: Planned Closure Tasks and Studies for Fimiston TSFs

TASK	TARGET COMPLETION DATE/PERIOD
Update / conduct reconciliation of materials balance after Fim IIE topsoil clearing	Added to the MCP after the clearing and reconciliation has been completed
Update TSF groundwater closure criteria to include Fim IIE 3rd cell and Fimiston III TSF	For Fimiston IIE 3rd cell, by next MCP submission after Fimiston South Section 38 approval; for Fimiston III TSF, by MCP after implementation level design work is completed

TASK	TARGET COMPLETION DATE/PERIOD
Alignment of operational and closure design for Fimiston III TSF and topsoil clearing plan for footprint	When implementation level design occurs, with following MCP updated
Review of water management on Fimiston TSFs	Review location and number of down chutes once buttressing and other operational changes are completed – timing within last 5 years of operation
TSF Decommissioning Plan	6 months prior to decommissioning
Final TSF Report (incl. verification water management features to specification)	After decommissioning and rehabilitation of TSF

9.2.5.7.3 Completed Closure Rehabilitation Activities for Fimiston TSFs

Table 9-34: Closure Implementation Status for Fimiston TSFs

FIMISTON TSF	STATUS	WORK COMPLETED 2015-2018	REHABILITATION ACTIVITIES COMPLETED 2019-2022
Fimiston I TSF	Active	• Closure engineering design studies • Workshops and studies to consider progressive implementation of rehabilitation	• Completed rehabilitation – **1.03** ha of TSF capping trial, with various thickness of rock and machinery trialled
Fimiston II TSF	Active	• Testing of rehabilitation material properties at the Fimiston II stockpiles • Closure engineering design studies • Workshops and studies to consider progressive implementation of rehabilitation • Haulage and engineering studies to develop a haul road design to transport capping material to the TSFs	• Construction of a haul road between the WRD capping source and Fim II/ Fim IIE and Kaltails TSFs in 2019 • Completed rehabilitation of **11.16ha** of northern flank of D Paddock, Fimiston II TSF in 2019/2020 • Completed rehabilitation of **7ha** of western flank of C Paddock, Fimiston II TSF in 2020 • Reshaping of northern flank of AB Paddock **6.8ha** in 2021
Fimiston II TSF Extension	To be constructed (2023)	• Alignment of operation design with closure design requirements	• Closure planning for proposed TSF, including closure design work, soil characterisation studies and topsoil clearing plan • Topsoil clearing plan for footprint
Kaltails TSF	Active	• Erosion maintenance work conducted on bench drains • Closure engineering design studies • Workshops and studies to consider progressive implementation of rehabilitation • Haulage and engineering studies to develop a haul road design to transport capping material to the TSFs	• Capping of **3.7ha** on the northern flank of East cell, Kaltails TSF in 2020

9.2.5.7.4 Planned Rehabilitation Activities

For the timing of Rehabilitation Activities, please refer to the consolidated Schedule of Activities in Section 9.7.

KCGM is currently conducting progressive rehabilitation on the Fimiston TSFs. This work will continue until the upper embankment slopes are rehabilitated.

The closure approach for TSFs is described in 9.2.5.4. Rehabilitation of the TSF slopes is currently occurring during the operational period, but most other activities can only be actioned after the facility has reached the end of its life.

9.2.5.7.5 Key Tasks for Premature Closure

An overarching strategy for Premature Closure is described in 9.1.3.

For premature closure, Fimiston TSFs would no longer receive tailings slurry. They would receive a smaller volume of flushing water when the tanks and lines at Fimiston Plant were flushed. The tailings lines would also be flushed out. Pumps and other water infrastructure would remain operational, and tailings dam freeboard would require management. Excess water would potentially be circulated within the piping system or saline water dams could be used as part of holding strategy. Geotechnical monitoring of the TSFs would continue. During this interim period, minimal maintenance would be required for this Domain, but pumps and essential pollution control systems would be required to be operational. And TSF ponds would need to be managed. A decision would need to be made on whether the site was moving into Care and Maintenance, or the intention was to restart operations or sell the operation. Should this not eventuate, closure works described in the section would be implemented.

9.3 Mt Charlotte Closure Domains

This section outlines the standard decommissioning and rehabilitation methods that will be utilised during closure of Mt Charlotte, in order to ensure that the requirements of the closure objectives and post closure land use are met. The standard decommissioning and rehabilitation approach has been summarised in Table 9-366, with further detail on high risk areas/areas of interest provided. Areas in Table 9-366 that are simple to rehabilitate and pose a low risk, such as laydowns, are not discussed in further detail.

9.3.1 Mt Charlotte Mining Infrastructure Domain

9.3.1.1 Description of Domain

Mt Charlotte has been operational since the 1960s, with the headframe constructed in 198.6

Mt Charlotte Mining Infrastructure includes (Figure 9-385):

- Glory Hole Pit;
- Underground Mine; and
- Surface Operations (including headframe, conveyor and core yard).

Figure 9-38: Mt Charlotte Mining Infrastructure

Mining at Mt Charlotte is expected to ceasing in 2034, but a skeleton crew will still remain to complete closure works.

Table 9-35 Mt Charlotte Mining Infrastructure

Domain: Mt Charlotte Mining Infrastructure	Area of Disturbance (Ha)	Stage of rehabilitation	Closure Date
Mt Charlotte (Glory Hole) Pit	4.	Operational	2034 + 2/3 yrs
Underground Mine	0 (surface)	Operational	2034 + 2/3 yrs
Surface infrastructure area	13.1	Operational	2034 + 2/3 yrs

Table 9-36: Standard Decommissioning and Rehabilitation Approach for Mt Charlotte Domain

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
Mt Charlotte (Glory Hole) Pit	Implement risk-based approach to prevention of inadvertent access to open pit areas, as required by Mines Safety and Inspection Regulations 1995	Restricted access due to Safety
Underground Mine	• Salvage any saleable plant/equipment; • Remove any bulk hydrocarbons; • Backfill of operational and historical stopes at Mt Charlotte with waste rock via the Glory Hole Pit; and • Seal off all operational access points to Mt Charlotte underground workings.	Restricting access due to Safety Shaft sealed at sub brace
Surface infrastructure area	• Salvage any saleable plant/equipment; • Remove any bulk hydrocarbons; • Remove buildings and other infrastructure; • Investigate potential contamination; • Decontaminate and make safe prior to demolition; • Dismantle/demolish all structures to below ground level or cap with clean fill; • Break up hard stand areas; • Break up concrete and bury or dispose of; • Break up scrap metal and recycle where possible; • Reshape surface where required; • Cross rip and seed with native species if the area is identified for revegetation; and • Dispose of assets: offer to other sites or auction.	Modified landscape, Fenced for Restricted access due to Safety

Figure 9-39: Mt Charlotte current rehabilitation status (2021)

9.3.1.2 Applicable Land Use Outcomes

Table 9-37: Completion Criteria for the Mt Charlotte Mining Infrastructure Domain

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe	Inadvertent access is restricted as much as practicable to any landforms or structures that are considered unsafe.	Removal or burial of all mine structures/buildings/foundations and machinery by suitable demolition / civil company unless legal liability accepted by post mining land owner. Transfer of ownership including legal documentation agreed to within reasonable timeframe (2 years), with legal documentation completed at time of closure implementation.	Buildings and Infrastructure	The footings/foundations/anchors of all mine structures/buildings/services to be buried at least 0.5 m below the final land surface.	Compliance certification (photographic and survey data) provided by demolition contractor for submission in Final Mine Relinquishment Report.
	Inadvertent access is restricted as much as practicable to any landforms or structures that are considered unsafe.	Removal or burial of all mine structures/buildings/foundations and machinery by suitable demolition / civil company unless legal liability accepted by post mining land owner. Transfer of ownership including legal documentation agreed to within reasonable timeframe (2 years), with legal documentation completed at time of closure implementation.	Transferred assets	The post closure retention of any mine infrastructure requires agreement from relevant Stakeholders and legal documentation of ownership transfer.	Transfer of ownership legal documentation included in Final Relinquishment Report.
		Limit ability of vehicular traffic to travel over crests through construction of adequately sized and positioned crest bunds on all possibly unsafe mine structures identified through area specific assessment. Incorporation of requirement into closure designs and planning. Fauna egress considered in design.	Mine waste landforms/ excavations	Crest / safety bunds constructed on any remaining excavation/ trench/channel/pit/embankment/ landform with slopes exceeding 25 degrees or depth exceeding 0.5 m.	Confirmation of construction of safety measures through visual inspection and/or aerial images.
		Construction of abandonment bunding around mine open pits	Open Pits Mt Charlotte (Glory Hole)	Pit abandonment bunding complies with Mines Safety and Inspection Regulations 1995 and DMIRS 1997 Guidelines (DOIR 1997) requirements.	Abandonment / safety bund completion recorded in MCP or associated close out documents – assessment via aerial photography / DTM or site inspection by suitable professional.

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe		Proactive management of existing (historical) mine waste landforms and infrastructure that are located within the zone of instability of open pits. Identification and assessment (as to the WRD instability risks should portions of the landform collapse into the pit) of landforms that are within the mine pit instability zone is by suitably qualified professional such as a geotechnical engineer. Calculation of pit zone of instability allows for geotechnical instability and erosion.	Open Pits Mt Charlotte (Glory Hole)	Geotechnically high risk unstable areas/mine structures/zones are captured within abandonment bunding/ safety bunds.	Completion of final assessment at end of mining operations recorded in MCP or associated closeout report. Submission of Final Relinquishment Report to DMIRS geotechnical engineers.
		Permanent sealing of portals and vent shaft openings to U/G mine workings.	Major Underground openings	Mt Charlotte portals and vent shaft openings to underground mine workings to have an engineered permanent seal.	As-constructed engineering drawing or photographic evidence of sealing of all U/G opening seals. Completion of implementation recorded in Final Relinquishment Report, provided to Mine Safety Inspector.
		Assessment of underground voids for geotechnical risk and unravelling by a geotechnical engineer. Record of underground voids requiring backfill and their backfill status -updated record (table) in MCP, showing implementation status (% fill).	Underground voids at Mt Charlotte	Major underground voids assessed to have long term geotechnical risk to be backfilled.	Final geotechnical risk and backfill assessment completion report by suitably qualified professional provided in Final Relinquishment Report.
Sustainable Land Use	Rehabilitate disturbed areas to a modified landscape receptive to vegetation regrowth and recovery over time considering visual amenity and properties of available rehabilitation materials.		Mt Charlotte	Mt Charlotte operational area revegetation has values indicative of the agreed post mining land use, modified landscape, accounting for limitations of the available materials used in rehabilitation.	

9.3.1.3 Closure Strategy

At an appropriate point, once all stope backfill is complete, and all salvageable items have been removed from underground, the Sam Pearce portal and all other shafts and portals will be sealed to engineering specifications, while allowing for long term groundwater discharge into the Fimiston Open Pit lake. All shafts and air vents will be effectively sealed. The Cassidy shaft is planned to be sealed at sub brace position. It is possible that some infrastructure, such as the Cassidy headframe may be retained for historical purposes, providing appropriate agreements for transfer of responsibilities are in place.

Mt Charlotte geochemistry has been characterised, with the study provided in Volume 3 (Appendix 5-10).

9.3.1.3.1 Safety Considerations

Safe – Inadvertent Public Access Post Closure

Public access to the Glory Hole Pit after closure has been identified as a safety risk. The *Mines Safety and Inspection Regulations 1995* require a risk based approach to prevention of inadvertent public assess of the pit or other mining features. KCGM intends to review existing approved plans for pit abandonment when developing the Open Pit Abandonment Strategy.

Safe – Demolition of Buildings and Infrastructure

The current closure plan is to demolish infrastructure at Mt Charlotte. Should a community organisation indicate interest in the Cassidy headframe, and third party responsibility for upkeep of the headframe can be agreed, within the constraints of safety restrictions for the area, alternative options can be considered.

Safe – Permanent seal of underground openings

Engineered permanent seals will be implemented for portals, vent shafts, and at the sub brace position of Cassidy Shaft.

Safe – Long term Geotechnical Stability

Collapse or settlement could occur if an underground void became unstable to the extent that it unravelled, and under these conditions the instability could potentially migrate towards the surface. Additionally, the walls of the Mt Charlotte Open Pit could potentially subside. In order to mitigate this risk, a programme is in place during operations which includes:

- Risk assessment of underground voids for potential for seismic risk or unravelling;
- Backfill historical underground stopes, with crushed rock from the Fimiston Open Pit via the Mt Charlotte Open Pit;
- Buttressing of the Mt Charlotte Open Pit with crushed rock from the Fimiston Open Pit, transported via conveyor, maintain the geotechnical stability of the pit walls.

More detailed information on this process is contained in Section 5.3.4.1.4 in Vol 1.

At end of operations, backfilling the remaining identified voids /stopes of the Mt Charlotte underground operations will be completed with crushed rock from the Fimiston Operational Area. There are some upper voids that can only be filled once mining operations cease. Once this work is complete, the final activity will be buttressing of the Mt Charlotte Open Pit with crushed or run of mine waste rock. An additional amount of material will be placed to allow for settlement. Due to the safety considerations and the limitations of available techniques, it is expected that the backfill will not be an evenly distributed shape, but rather an uneven cone type shape. Quantities for buttressing, with an allowance for subsidence, are calculated at 2.6 M tonnes. The final surface will not be trafficable for earthmoving machinery. The area will not be suitable for vehicle or pedestrian access.

Geotechnical assessment has indicated that the buttressing of the open pit will result in the Zone of Instability line being very close to pit edge. A safety bund, of smaller dimensions than an abandonment bund (nominally 1m high) will still be placed along the perimeter and encompass other areas which have voids close to surface (these voids will be backfilled). The proposed location of the safety bund is shown in Figure 9-40.

Most closure activities for Mt Charlotte Operational Area can only commence at end of mine life. The exception is underground backfill of historic voids. Mt Charlotte mine life is currently to 2025, which has a closure benefit, as operational waste is used to fill these historic voids.

Figure 9-40: Mt Charlotte Operational Area conceptual safety bund position

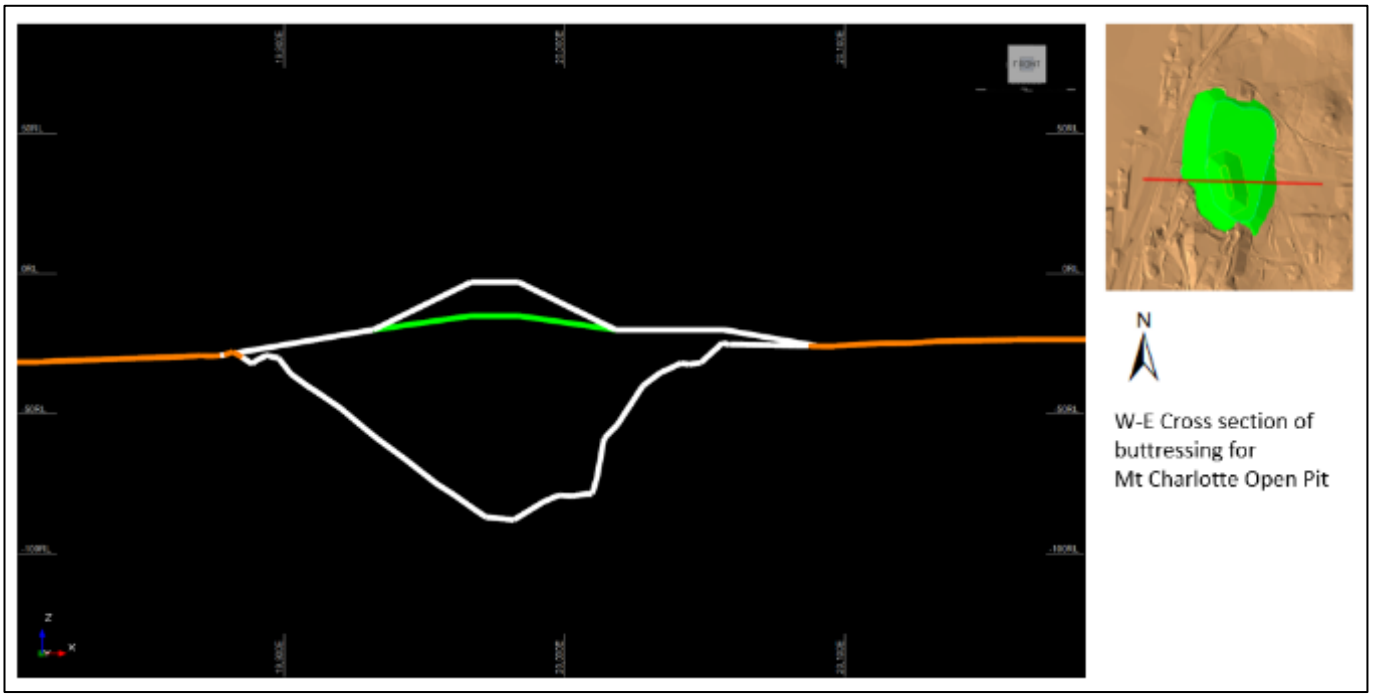


Figure 9-41: Mt Charlotte Open Pit buttressing (with allowance for settlement)

9.3.1.3.2 Sustainable Land Use and Rehabilitation Resources

A small eastern section of Mt Charlotte area has been rehabilitated. There are no topsoil stockpiles at Mt Charlotte. The area is an oxide hill, and it is likely that there will be regrowth if the area is ripped and seeded.

9.3.1.3.3 Groundwater Management

Post closure flooding of the underground workings was modelled in 2014 (summary provided in Appendix 5-9). The model identified that once the underground workings are abandoned, and dewatering is terminated, the water level in the workings will gradually recover towards the pre-mining groundwater elevation (335 mAHD). Post closure, the workings will continue to receive rainwater through the Glory Hole, and low flows from the rock mass. After approximately 99 years, the water level is predicted to reach the elevation of the outlet of the Sam Pearce Decline (316 mAHD), with discharge predicted to occur into the Fimiston Open Pit from the decline portal at an average 33 kL/day (0.4 L/s), with most of the water likely evaporating prior to reaching the Fimiston Pit lake. Mining is the only identified beneficial user for this saline groundwater system. As such, flooding of the Mt Charlotte UG post closure is not expected to have any adverse impacts on the surrounding groundwater or the formation of the Fimiston Open Pit pit lake. The Mt Charlotte hydrological prediction study can be found in Volume 3 (Appendix 5-9), and is accounted in calculations for Fimiston Open Pit Lake model in Volume 3 (Appendix 5-2).

9.3.1.4 Knowledge Gaps

Mt Charlotte Operational Area will be assessed for further geotechnical study requirements, with respect to buttressing. Underground void management is well understood and managed.

9.3.1.5 Closure Implementation Status

9.3.1.5.1 Completed Closure Tasks and Studies

Table 9-38: Completed Tasks and studies for Mt Charlotte Mining Domain

FEATURE	STATUS	WORK COMPLETED 2015-2018
Glory Hole	Operational	• Ongoing underground backfill of historic voids via the Glory Hole. • Open Pit Abandonment Strategy Project: • Update of voids and Glory Hole information for Mt Charlotte

9.3.1.5.2 Planned Closure Tasks & Studies

For scheduling details on Tasks please refer to Section 9.7.

Table 9-39: Planned Tasks and studies for Mt Charlotte Mining Domain

TASK	TARGET COMPLETION DATE/PERIOD
Pit wall stability monitoring	Ongoing operational function; will continue during closure
Final Shaft Sealing Report	After closure works are complete
Final geotechnical review and report	After post closure monitoring period

9.3.1.5.3 Planned Rehabilitation Activities

For the timing of Rehabilitation Activities, please refer to the consolidated Schedule of Activities in Section 9.7.2

Table 9-40: Planned Rehabilitation Activities for Mt Charlotte Mining Domain

FEATURE	APPROACH
Domain: Mining Infrastructure	
Glory Hole Pit	Implement risk based approach to prevention of inadvertent access in open pit areas, as required by Mines Safety and Inspection Regulations 1995, with safety bund placed around the perimeter
Underground Mine	• Salvage any saleable plant/equipment; • Remove any bulk hydrocarbons; • Backfill of operational and historical stopes at Mt Charlotte with waste rock via the Mt Charlotte Open Pit; • Buttress Mt Charlotte Open Pit and place safety bund around perimeter; and • Seal off all operational access points to Mt Charlotte underground workings.

9.3.1.6 Key Tasks for Premature Closure

An overarching strategy for Premature Closure of Fimiston Operational Area is described in 9.1.3.

For premature closure, this Domain would move into Care and Maintenance, with the intention to restart operations. Should this not eventuate, closure works described in this Section would be implemented.

9.4 Gidji Closure Domains – MS 1032

The Gidji closure Domain consists of the Gidji Mineral Processing Plant, with associated infrastructure and the Gidji TSF Domain. The relocation of KCGM roasting activities to the Gidji site was part of initiatives undertaken to improve air quality in the vicinity of Kalgoorlie-Boulder. In 2015 the Gidji Roasters were shut down and replaced by an ultrafine grind mill, ending KCGM's roasting activities. Gidji plant receives the majority of Fimiston plant's concentrate via road train for processing.

Waste from the Processing Plant is pumped to the Gidji TSF Domain for storage. Roaster tailings (Gidji I TSF) are NAF, while ultrafine grind tailings are PAF (Gidji II TSF).

This section outlines the planned decommissioning and rehabilitation methods that will be utilised during closure of the Gidji Domains, in order to ensure that the requirements of the closure objectives and post closure land use are met. The standard decommissioning and rehabilitation approach has been tabulated in Table 9-41, with further detail on higher risk areas/areas of interest provided below.

Areas described in Table 9-41 that are simple to rehabilitate and pose a low risk, such as laydowns, are not discussed in further detail.

Figure 9-42: Gidji Processing Plant (2021)

Table 9-41: Standard Decommissioning and Rehabilitation Approach for Gidji Domain

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
Domain: Mineral Processing Infrastructure		
Processing Plant and Support Infrastructure	• Run down reagent inventory and hydrocarbons prior to closure date; • Salvage remaining gold from plant; • Remove buildings and other infrastructure; • Investigate potential contamination; • Cyanide decontamination of plant and equipment as per Cyanide Decommissioning Plan; • Decontaminate and make safe prior to demolition; • Dismantle/demolish all structures to below ground level unless specified otherwise by appropriate approvals; • Break up hard stand areas; • Break up concrete and bury or dispose of; • Break up scrap metal and recycle where possible; • If required, capping to meet contaminated sites requirements; • Reshape surface where required; • Rip on the contour and seed with native species if the area is identified for revegetation; and • Dispose of assets: offer to other mine sites or auction.	Modified landscape Potentially restricted access Potentially excluding pastoral use
Domain: Tailings Storage Facilities		
Gidji I, Gidji II	• Remove piping, decant pumps and other infrastructure; • Allow sufficient drying time (est. 2-3 years); • Profile outer embankments of landform to reduce long term erosion and promote stability; • Cover outer slopes and surfaces with appropriate waste rock for erosion protection; • Upper surface of TSF to be reshaped for water retaining design and capped with appropriate material for dust management;	Modified landscape Restricted access due to Safety Excluding pastoral use

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
	• Rip on the contour and seed with native species if identified for revegetation; • Maintain fencing to restrict access to landform until relinquishment (or no longer required); • Continue seepage and groundwater abstraction until monitoring confirms that active management is no longer required; and • Backfill all seepage trenches and ponds when no longer required.	
Tailings Delivery and Decant Water Return Lines (including bunds)	• For above ground pipelines, flush and remove and sell or recycle where possible, unless specified otherwise; • For buried pipelines, flush and leave buried unless they pose a future risk; and • Reinstate areas along pipelines and re-vegetate as appropriate.	Modified landscape Potentially restricted access due to Safety Potentially excluding pastoral use
Domain: Water Abstraction and Containment Facilities		
Lined Water Storage Dams	• Slash liner and bury during backfilling of dam; • Reshape surface and sheet with rehabilitation materials where necessary and available; and • Rip on the contour and seed with native species of local provenance if the area is identified for revegetation.	Modified landscape Potentially restricted access due to Safety Potentially excluding pastoral use
Seepage Recovery and Water Supply Bores	• Retain as required during post closure period for seepage recovery; • Once no longer required, decommission as per DoW guidelines; or • Retain and transfer to a third party.	Modified landscape
Monitoring Bores	• Retain selected bores for compliance monitoring during post closure period; • Once no longer required, water bores are to be decommissioned as per DWER guidelines; • Remove surface casings, collar and plug hole, mound dirt over plugged hole; • Reshape surface where required; and • Rip on the contour and seed with native species if the area is identified for revegetation.	Modified landscape Potentially restricted access (due to location within TSF fenced area) Potentially excluding pastoral use (due to location within TSF fenced area)
Pipelines	• For above ground pipelines, flush and remove and sell or recycle where possible, unless specified otherwise; • For buried pipelines, flush and leave buried unless they pose a future risk; and	Modified landscape

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
	• Reinstate areas along pipelines and re-vegetate as appropriate.	
Domain: Miscellaneous		
Power/Gas Supply Lines	• For above ground lines, remove and sell where possible or dispose of unless specified by appropriate approvals; • For buried lines, leave buried unless they pose a future risk; and • Reinstate areas along routes and re-vegetate as appropriate.	Modified landscape
Roads and Tracks	• Remove windrows and reinstate natural drainage function; • Rip sealed roads and dispose of material appropriately; • Rip unsealed roads unless specified otherwise by appropriate approvals; • Sheet with rehabilitation materials where available; and • Seed with native species.	Modified landscape
Diesel Tank	• Run down fuel levels at completion of post closure activities; • Decommission fuel system; • Investigate potential contamination; • Dismantle/demolish all structures to below ground level unless specified otherwise; • Break up concrete and bury or dispose of; • Break up scrap metal and recycle where possible; • Reshape surface and sheet with rehabilitation materials where required and available; • Rip on the contour and seed with native species if the area is identified for revegetation;	Modified landscape Potentially restricted access Potentially excluding pastoral use
Laydowns	• Break up scrap metal and recycle if present; • Dispose of assets: offer to JV owners or auction; • Break up hard stand area; • Reshape surface and sheet with rehabilitation materials where required and available;	Modified landscape

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
	• Rip on the contour and seed with native species if the area is identified for revegetation;	
Rehabilitation Materials Stockpiles	• Reshape surface where required; and • Rip on the contour and seed with native species if required.	Modified landscape

9.4.1 Gidji Mineral Processing Infrastructure Domain

9.4.1.1 Description of the Domain

Figure 9-43: Gidji Processing Plant (2021)

The Gidji Mineral Processing Plant will continue to operate for the same time period as the Fimiston Mineral Processing Plant. The current 2020 LOM puts this timeframe at 2038.

The Gidji Plant was previously a roasting operation, with 2 roasters and a stack. In 2015 the roasters were shut down and replaced by an ultrafine grind mill. In 2016/2017 progressive rehabilitation was undertaken and the roasters were demolished. At the time, consideration was given to demolition of the stack, however this was not undertaken as there was a very high risk to operational structures and significantly higher cost associated with this demolition, as well as additional clearing for the stack to be dropped to the south.

The Gidji Processing Plant occupies a very small area of 5.7ha. Laydown areas, which are a low risk in terms of rehabilitation, cover a further 10.3ha.

Table 9-42: Gidji Processing Plant disturbance and estimated closure implementation dates

DOMAIN: MINERAL PROCESSING INFRASTRUCTURE	AREA OF DISTURBANCE	STAGE OF REHABILITATION
Processing Plant and Support Infrastructure Including Diesel Tank and Power infrastructure	5.7	Operational until 2034
Laydowns	10.3	Operational until 2034
Lined Water Storage Dams	0.6	Operational until 2034
Seepage Recovery and Water Supply Bores; Monitoring Bores	4.4	Operational until 2034
Pipelines	3.1	Operational until 2034

9.4.1.2 Applicable Land Use Outcomes

9.4.1.2.1 Post Mining Land Use and Closure Criteria

The post closure land use for the Gidji Mineral Processing Plant is a rehabilitated modified landscape, potentially restricted for use and pastoral use. The Plant is located on vacant crown land, adjacent to pastoral lease and is surrounded by diamond mesh fencing.

9.4.1.3 Closure Strategy

The Gidji Plant and associated infrastructure (Figure 9-43) will be demolished and the area rehabilitated to reflect the final land use of rehabilitated modified landscape, potentially restricted for use and potentially restricted for pastoral use. Contaminated Sites requirements will be planned during the final operational phase, but can only be implemented during decommissioning. A conceptual demolition plan, with costing, and the Cyanide Decommissioning Plan, have been developed for Gidji Plant.

Once demolition has been completed, contaminated sites sampling, and potential remediation, will be required. This work will drive the final outcome for Gidji Plant, determining whether it will result in a 'restricted use' classification. For the purposes of conservative closure planning, it has been assumed that this is a likely outcome. Based on the contaminated sites investigation, it is expected that the area will require a capping, most likely of nominally 0.5 m of clean waste material, to meet contaminated sites requirements. Fencing may be required initially.

Safe – Limit Inadvertent Access

The Gidji Plant area may require restricted access if contamination is identified after closure demolition and Contaminated Sites investigation.

Non pollution – Hazardous materials

There is a risk that hazardous materials such as metals and high cyanide will be identified at Gidji plant during closure works. The most likely closure strategy will be encapsulation of the area of concern after Contaminated Sites investigations have been conducted.

Sustainable Land Use – Revegetation

No rehabilitation has been conducted at Gidji to date as all facilities are currently operational. Thus, it is hard to assess potential issues for Gidji rehabilitation, other than a shortage of growth media and, from recent soil studies, knowledge that the available growth media are relatively poor quality sodic soils.

9.4.1.4 Rehabilitation Materials

There are no rehabilitation material stockpiles associated with the Gidji Mineral Processing Plant. Laydown areas will be ripped and seeded. The Gidji Plant area will be capped with material suitable from a contaminated sites point of view. If possible, local borrow could be used to provide a growth media for the Gidji Plant area. Alternatively, should some TSF rehabilitation material remain, it could be scheduled to the Gidji Plant area, however volumes are limited at this stage of planning.

9.4.1.5 Closure Implementation

The Gidji Plant and associated infrastructure (Figure 9-43) will be demolished and the area rehabilitated to reflect the final land use of rehabilitated modified landscape, potentially restricted for use and potentially restricted for pastoral use. Contaminated Sites requirements will be planned during the final operational phase, but can only be implemented during decommissioning. A conceptual Demolition Plan, with costing, and the Cyanide Decommissioning Plan, have been developed for Gidji Plant.

Once demolition has been completed, contaminated sites sampling, and potential remediation, will be required. This work will drive the final outcome for Gidji Plant, determining whether it will result in a 'restricted use' classification. For the purposes of conservative closure planning, it has been assumed that this is a likely outcome. Based on the contaminated sites investigation, it is expected that the area will require a capping, most likely of nominally 0.5 m of clean material, to meet contaminated sites requirements. Fencing may be required initially.

There is currently no rehabilitation material stockpiled for the Gidji Plant area, and local borrow may have to be used, depending on the properties of the selected capping material.

Table 9-43: Gidji Mineral Processing Plant Completion Criteria

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe	Inadvertent access is restricted as much as practicable to any landforms or structures that are considered unsafe.	Removal or burial of all mine structures/buildings/foundations and machinery by suitable demolition / civil company unless legal liability accepted by post mining land owner. Transfer of ownership including legal documentation agreed to within reasonable timeframe (2 years), with legal documentation completed at time of closure implementation.	Buildings and Infrastructure	The footings/foundations/anchors of all mine structures/buildings/services to be buried at least 0.5 m below the final land surface.	Compliance certification (photographic and survey data) provided by demolition contractor for submission in Final Mine Relinquishment Report.
	Inadvertent access is restricted as much as practicable to any landforms or structures that are considered unsafe.	Removal or burial of all mine structures/buildings/foundations and machinery by suitable demolition / civil company unless legal liability accepted by post mining land owner. Transfer of ownership including legal documentation agreed to within reasonable timeframe (2 years), with legal documentation completed at time of closure implementation.	Transferred assets	The post closure retention of any mine infrastructure requires agreement from relevant Stakeholders and legal documentation of ownership transfer.	Transfer of ownership legal documentation included in Final Relinquishment Report.
		Limit ability of vehicular traffic to travel over crests through construction of adequately sized and positioned crest bunds on all possibly unsafe mine structures identified through area specific assessment. Incorporation of requirement into closure designs and planning. Fauna egress considered in design.	Mine waste landforms/ excavations	Crest / safety bunds constructed on any remaining excavation/ trench/channel/pit/embankment/ landform with slopes exceeding 25 degrees or depth exceeding 0.5 m.	Confirmation of construction of safety measures through visual inspection and/or aerial images.

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Non Polluting	The landforms containing materials of concern will be managed to minimise impacts to the quality of the surrounding environment.	Operational hazardous materials management practices continued during closure operations. Chemical inventory drawn down close to closure with pipelines and vessels cleaned. Inspection prior to demolition. Implement requirements of Contaminated Sites Act for identified risk areas, analysis by competent specialists.	Mineral Processing areas –Gidji	All reagents and chemicals removed from site without any residual site contamination investigated and actioned as per the *Contaminated Sites Act 2003.*	As required, monitoring in accordance with Contaminated Sites requirements.
Sustainable Land Use	Rehabilitate disturbed areas to a modified landscape receptive to vegetation regrowth and recovery over time considering visual amenity and properties of available rehabilitation materials.		Gidji	Gidji operational area has values indicative of the planned target post mining land use of modified landscape, accounting for limitations of the largely sodic soils available for rehabilitation.	Rehabilitation performance monitoring using accepted vegetation monitoring techniques and measures. Includes assessment against targets values, and demonstration of the ability to become self-sustaining (as detailed in Section 10).

9.4.1.5.1 Closure Implementation Status

Completed Closure Tasks and Studies

No other closure works have commenced as the plant and tailings facilities are in active use.

Table 9-44: Completed Closure Tasks and Studies

FEATURE	STATUS	WORK COMPLETED 2015-2022
Gidji Mineral Processing	Operational	• Contaminated Sites risk ranking process completed; • Roasters decommissioned and demolished in 2016/2017; • Ongoing management of hydrocarbons and other materials of concern through KCGM Integrated Management System; • Further work not applicable at this point in LOM.

Planned Closure Tasks and Studies

For scheduling details on Tasks please refer to Section 9.7.

Table 9-45: Planned Closure Tasks and Studies

TASK	TARGET COMPLETION DATE/PERIOD
Demolition Planning	Completed; updated in 2017
Opportunistic contaminated sites subsoil sampling	Ongoing

Planned Rehabilitation Activities

Rehabilitation for this Domain can only be implemented after Mineral Processing is finished in 2038. For the timing of Rehabilitation Activities, please refer to the consolidated Schedule of Activities in Section 9.7.

Table 9-46: Planned Closure Rehabilitation Activities for Gidji Mineral Processing Domain

FEATURE	APPROACH
Domain: Mineral Processing Infrastructure	
Processing Plant and Support Infrastructure	• Run down reagent inventory and hydrocarbons prior to closure date; • Salvage remaining gold from plant; • Remove buildings and other infrastructure; • Investigate potential contamination; • Dispose or remediate contaminated material as per *Contaminated Sites* requirements; • Cyanide decontamination of plant and equipment as per Cyanide Decommissioning Plan; • After decontamination and making safe (particularly electrical risks), implement demolition; • Dismantle/demolish all structures to below ground level unless specified otherwise by appropriate approvals; • Break up hard stand areas; • Break up concrete and bury or dispose of; • Break up scrap metal and recycle where possible; • Reshape surface where required; • If required, capping to meet contaminated sites requirements; • Rip on the contour and seed with native species if the area is identified for revegetation; and • Dispose of assets: offer to other mine sites or auction.

9.4.1.6 Information Gaps

Knowledge gaps for Gidji Mineral Processing Plant are primarily around potential contamination, which can only be studied in detail after demolition activities have been undertaken. Environmental management systems are in place during operations to minimise the potential for contamination to occur.

9.4.1.7 Key Tasks for Premature Closure

An overarching strategy for Premature Closure is described in Section 9.1.3.

For premature closure, Gidji Plant would require flushing of tanks and lines and other preparation tasks essential to allow a stage shutdown of equipment. Tailings and other lines would be flushed out. Reagents and other usable items would be transferred to other mine sites or sold, until a decision could be made on whether the site was moving into Care and Maintenance or the intention was to restart operations or sell the operation. Should this not eventuate, closure works described in Section 9.4. would be implemented.

9.4.2 Gidji Tailings Storage Facilities Domain

9.4.2.1 Description of Domain

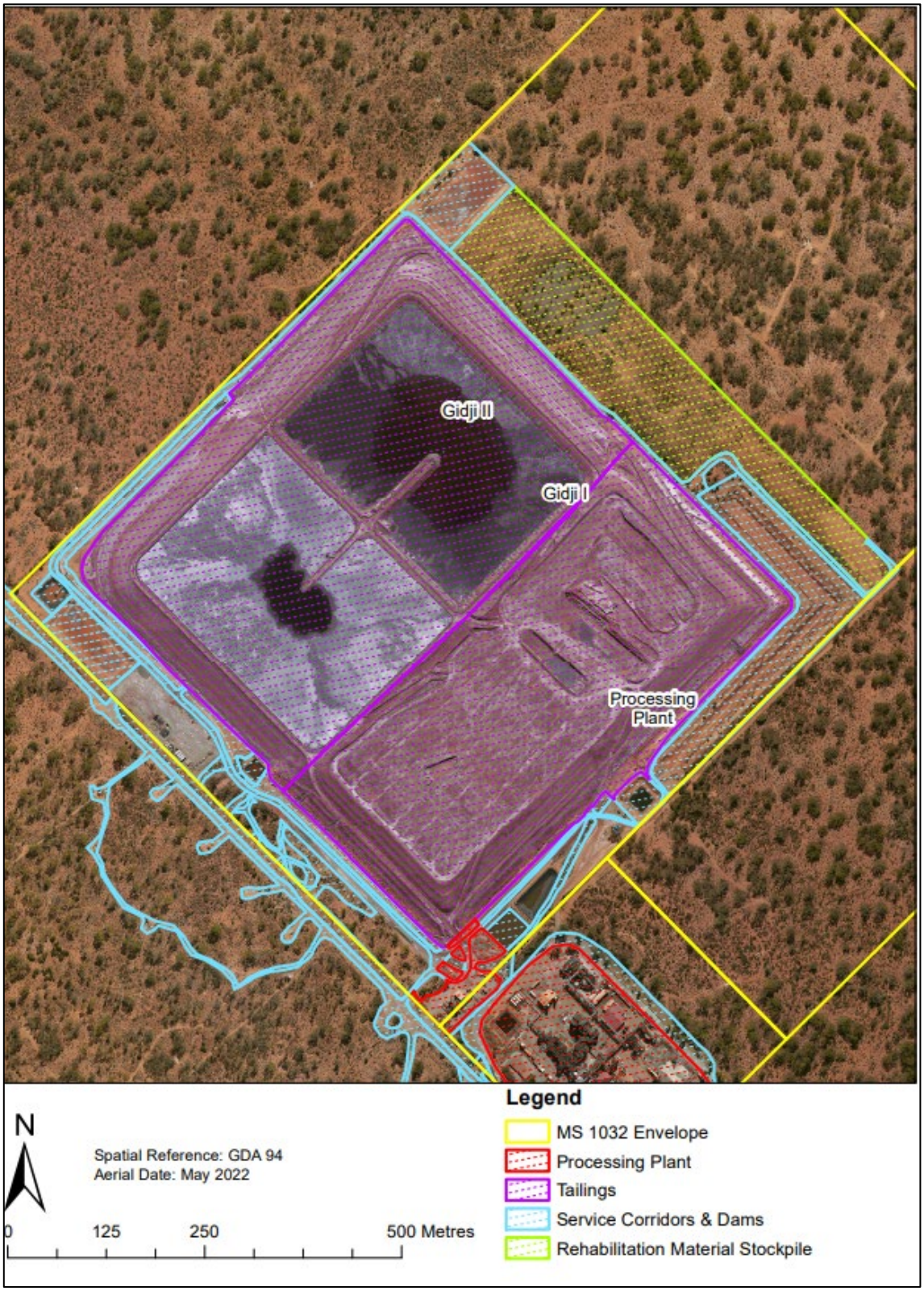


Figure 9-44: Gidji TSFs

The Gidji TSF Domain consists of:

- Gidji I, an upstream constructed NAF unlined TSF, which is reducing in volume and size due to the use of its material for wall construction of Gidji II and III TSFs;
- Gidji II and III, downstream constructed PAF lined TSFs;
- Associated infrastructure such as pipelines (double skinned), ponds, and laydown areas.

Table 9-47: Gidji TSF disturbance and estimated closure implementation dates

DOMAIN: TAILINGS STORAGE FACILITIES	AREA OF DISTURBANCE	STAGE OF REHABILITATION
Gidji I	17.5	Operational (used as borrow material for construction of Gidji II TSF)
Gidji II	24.8	Operational
Rehabilitation Materials Stockpiles	6.3	Operational

9.4.2.2 Applicable Land Use Outcomes

9.4.2.2.1 Post Mining Land Use and Closure Criteria

The post closure land use for the Gidji TSFs is rehabilitated modified landscape, with restricted access due to safety, and excluding pastoral use. The TSFs are located on vacant crown land, adjacent to pastoral lease and are surrounded by diamond mesh fencing.

Table 9-48: Gidji TSFs Completion Criteria

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe		Limit ability of vehicular traffic to travel over crests through construction of adequately sized and positioned crest bunds on all possibly unsafe mine structures identified through area specific assessment. Incorporation of requirement into closure designs and planning. Fauna egress considered in design.	Mine waste landforms/ excavations	Crest / safety bunds constructed on any remaining excavation/ trench/channel/pit/embankment/ landform with slopes exceeding 25 degrees or depth exceeding 0.5 m.	Confirmation of construction of safety measures through visual inspection and/or aerial images.
Geo-Physically Stable	Mine landforms achieve long term geotechnical stability.	Monitor TSF draindown during closure period for TSF stability.	TSFs	TSF FoS > 1.5 at completion of closure monitoring and downward trending phreatic surface (ANCOLD 2019 or approved alternative).	TSF embankment stability assessment as per ANCOLD 2019 Guidelines, verified by suitably qualified engineer.
	Long term erosion stability and integrity of engineered mine landform covers based geomorphological processes observed within the local region.	Effective landform surface drainage control measures based on landform water retaining designs.	TSFs	Appropriately implemented surface water management structures on TSFs as per ANCOLD 2019 Guidelines. Rehabilitation implementation meets design intent with appropriately implemented surface water management structures on WRDs i.e. erosion resistant design has water catchment on benches and water retaining design slope cover.	Design and implementation verified by suitably qualified engineer and recorded in MCP or associated close out documents.
		Landform cover designs based on scientific modelling (300 yr time frame) or site specific trials/monitoring performance under expected regional climatic conditions. Rehabilitation Performance Assessment of trial plots and implementation of findings in final cover designs.	TSFs	Rates of erosion of landform covers are within an acceptable range taking into account regional climatic conditions and material characteristics and do not impact on the geotechnical integrity of the landform. No visual evidence of active gully erosion exposing underlying dispersive and/or unstable material.	Site inspection report and whole of landform aerial photographic analysis by suitably qualified professional.

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Geo-Physically Stable		Where possible restrict, access to rehabilitated mine waste landforms by human traffic and domestic livestock grazing to minimise potential for damage to constructed covers.	Mine waste landforms especially TSFs	Where required and practicable, access to rehabilitated landforms is to be limited through the use of fences or rock bunds. Perimeter fencing in place around all TSFs and access to Gidji TSFs restricted.	Site inspection records (including photographs and GIS mapping) to verify installation of fences to limit access recorded in MCP or associated close out documents.
Non Polluting	The landforms containing materials of concern will be managed to minimise impacts to the quality of the surrounding environment.	Materials with potential (long lag) to generate AMD are placed in a demarcated area and have an appropriate closure capping design to minimise risk of AMD.	Ore stockpile – Black Flag shale Gidji TSF	High Grade Black Flag stored within dedicated stockpile area with encapsulation closure design. Gidji TSF closure design is appropriate for AMD material	Record of high grade BF ore stockpile capping design and implementation in MCP or associated close out documents. Record of Gidji design implementation in MCP or associated close out documents.
		Minimisation of sediment movement from the immediate footprint of mine landforms through use of effective covers, drainage control and toe sediment retention bunds.	TSFs	Mine waste landforms do not actively discharge alluvial fans into adjacent natural drainage lines (creeks). No discharge of sediment or contaminants of concern beyond the assimilative capacity of the local environment based on Australian Standards.	Aerial photography verification of no active alluvial fans extending beyond the immediate foot print of mine waste landforms. Action if identified. Relevant post closure groundwater and surface runoff monitoring data.
		Formulation and implementation of post closure seepage management plan if impacts on the beneficial users of groundwater and vegetation.	TSFs	No discharge of seepage waters that impacts on beneficial use of groundwater. Groundwater levels remain below or at depth targets.	Groundwater level monitoring of appropriately scaled monitoring network, until proposed groundwater depth targets are achieved. Final groundwater closeout report by suitably qualified professional.
Sustainable Land Use	Rehabilitate disturbed areas to a modified landscape receptive to vegetation regrowth and recovery over time considering visual amenity and properties of available rehabilitation materials.		Gidji	Gidji operational area has values indicative of the planned target post mining land use of modified landscape, accounting for limitations of the largely sodic soils available for rehabilitation.	Rehabilitation performance monitoring using accepted vegetation monitoring techniques and measures. Includes assessment against target values, and demonstration of the ability to become self-sustaining (as detailed in Section 10).

9.4.2.3 Closure Strategy

The previous closure design for the Gidji TSF was developed in 2011, which comprised a design that detailed a water shedding cover from the closed Gidji I over the (operational) Gidji II TSFs. The design did not take into account the long term reduction in the height of the Gidji I TSF.

The introduction of the third TSF at the Gidji site has triggered a comprehensive re-assessment of conceptual designs, given the change in geometry and other parameters that can be followed though to detailed design and closure. A substantial number of studies have been undertaken on the Gidji TSFs over the last closure planning period.

Safe – Limit Inadvertent Access

The Gidji TSFs require limiting access of pedestrian, vehicular or pastoral animal traffic, due to their PAF nature, to ensure that there is no structural damage done to the closed facility.

Geophysically Stable – Long Term Geotechnical Stability

Soil sampling and early soil erosion work has been conducted in 2019 and 2020. Further studies are currently being undertaken, to understand the limitations of the materials for detailed design.

Geophysically Stable – Long Term Geotechnical Stability

Current closure designs are being undertaken by a team of experts, including tailings engineers, to ensure that designs meet this requirement. As the TSFs are contained within a liner, further work with respect to water balance will be undertaken before a more detailed design can be progressed.

Non polluting – Hazardous materials & Sediment

Due to the PAF material present in the TSFs, encapsulation is the current strategy. As the TSF Closure design will be water retaining, sediment discharge is unlikely, except a small amount from slope rehabilitation areas initially.

Non polluting – Seepage

The Gidji I plume is currently being dewatered by the production borefield associated with the TSF. Bore yields are currently decreasing and dewatering is expected to be complete prior to end of LOM. The monitoring and production bores will remain in place, in case of the unlikely event that there is seepage from Gidji II and III TSFs.

Sustainable Land Use – Revegetation

No rehabilitation has been conducted at Gidji to date, as all facilities are currently operational. Thus, it is hard to assess potential issues for Gidji rehabilitation, other than a limited growth media inventory and, from recent soil studies, knowledge that the available growth media are relatively poor quality sodic soils. The soil properties are expected to play a role in the rehabilitation, for example, reduced plant density.

9.4.2.3.1 Geochemical Considerations

The tailings generated from the UFG processing is currently deposited into Gidji II TSF. These tailings are PAF have a higher sulphide content, than Gidji I TSF material. Management of these tailings during operations and closure has therefore been designed to minimise the potential for infiltration and seepage, with a liner and overliner drainage system. Should seepage losses be detected, the existing Gidji I TSF monitoring and production bores are already in place to ensure effective management.

The geochemical properties of the Gidji II tailings are:

- Hypersaline;
- Potentially Acid Forming (PAF) with a high sulfur content with Acid Metalliferous Drainage (AMD) potential;
- Enriched with metals and metalloids;
- Potentially able to oxidise, forming leachate waters with elevated chemical concentrations.

The geochemical properties of the Gidji I tailings are:

- Saline
- Non Acid Forming (NAF).

Geochemical studies are provided in Volume 3 (Appendix 5.11).

9.4.2.3.2 Geotechnical Considerations

Geotechnical requirements have been considered during studies for the closure design of the Gidji TSFs, as evidenced in the draft closure design criteria presented in Table 9-49, developed by a technical team, including the Engineer on Record and members of the TSF design team.

9.4.2.3.3 Seepage and Groundwater Management

The ferricrete and alluvial sediment groundwater system is present below the Gidji TSFs, and seepage from the unlined Gidji I TSF has caused groundwater levels to mound in the immediate vicinity of the TSFs (**Error! Reference source not found.Error! Reference source not found.**). During operations, a seepage and groundwater recovery borefield has been operated to control groundwater levels and prevent the naturally saline groundwater from rising into the root zone of vegetation. The borefield also acts to minimise the migration of the elevated TDS and WAD CN concentrations in groundwater. Recovered seepage is currently used within the Gidji Processing Plant, with volumes diminishing due to Gidji I TSF no longer being operational and the Gidji II TSF being a lined facility (ie no contribution to seepage).

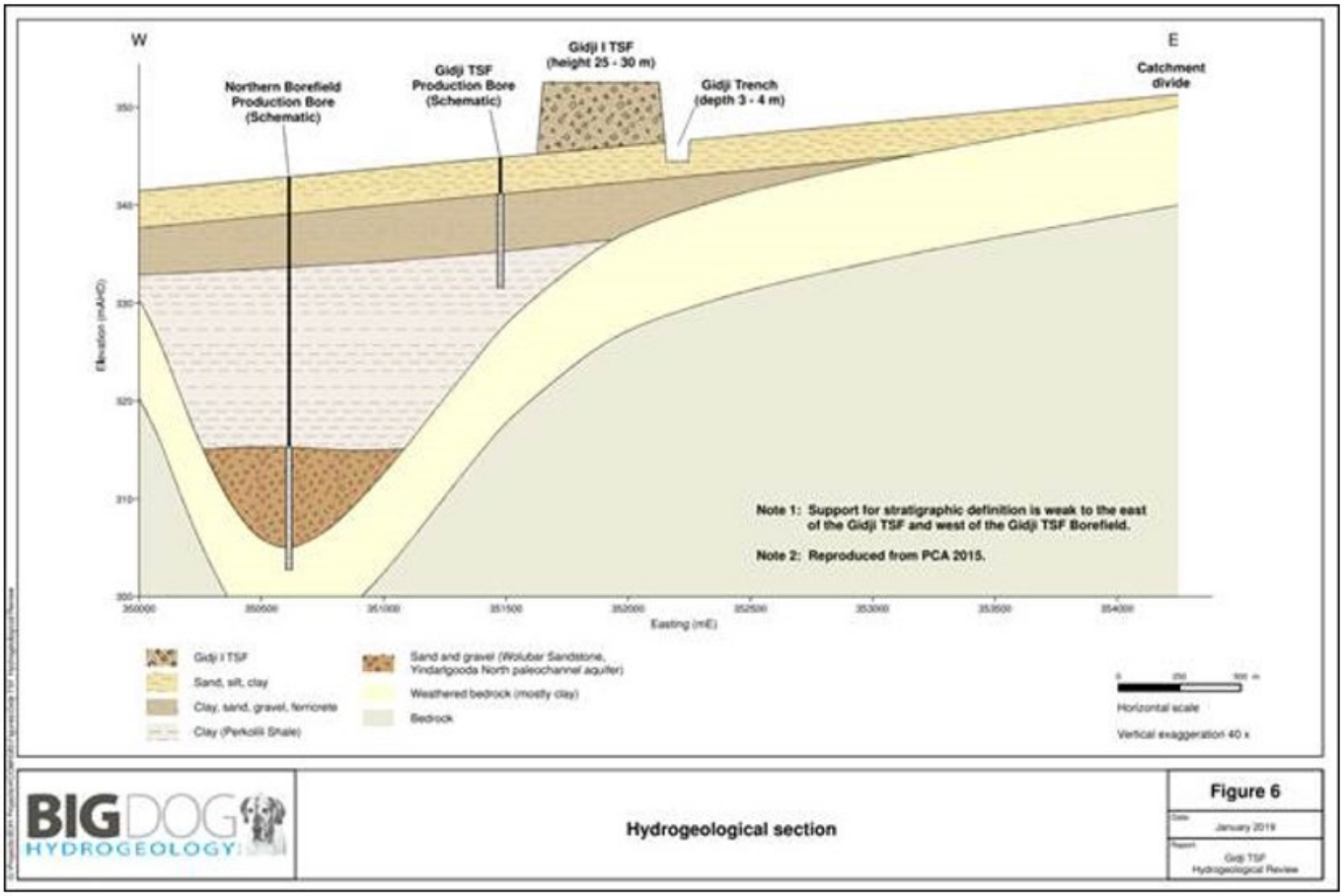


Figure 9-45: East-West Hydrological Section at Gidji

Gidji I TSF and Gidji II TSF have an existing production and monitoring bore network with DWER licence controls and requirements. Seepage from Gidji I is collected from a network of production bores, primarily located in the SW sector, and from a seepage trench before being pumped into the internal water circuits. Seepage from Gidji II TSF is extremely unlikely as the TSF is lined, with an overliner drainage system. Water entering this system is pumped into the internal water circuit for reuse within the Gidji processing plant. A network of monitor bores exists around the TSFs, and monitoring results show no evidence of seepage from the Gidji II TSF into the local groundwater system. A TSF hydrogeological report is provided in Volume 3 (Appendix 5-12).

From 2012 to 2018, average annual pumping has reduced from 4.2 l/s to around 0.7 l/s. due to the reducing submergence of the pumps installed in the bores. Groundwater levels are currently greater than 6 m below ground in the identified seepage zone and are continuing to deepen in response to dissipation of the groundwater mound and the operation of the Gidji Seepage Interception System. It is anticipated that groundwater levels will decline to the point that the Gidji Seepage Interception System (Figure 9-45)can no longer be operated within the next few years, and that the bores will be placed on standby for the rest of the operating period for the Gidji II and possible future TSFs. Therefore, it is anticipated that no ongoing active management of groundwater at the Gidji operational area will be required post closure.

Bores closest to the South Western wall of Gidji I are expected to be the last production bores to be operational as water levels reduce further over the next 5 years. The precise bores that will be the last to be able to pump seepage will be dependent on the nature of the sediments intersected and the connectivity of the ferricrete lens within the sedimentary aquifer. In the unlikely event that some remaining production bores are able to continue to operate at the end of operations, the requirement to continue operating these bores in closure will be evaluated The remaining production bores, if any, that require ongoing operation will be evaluated when the decommissioning plan is prepared. Monitoring will continue until the requirements for Contaminated Sites are satisfied.

9.4.2.3.4 Contaminated Sites requirements

The final land use for Gidji TSF, as well as the selected closure designs are strongly driven by consideration of Contaminated Sites requirements. The Gidji I TSF (NAF material) groundwater plume containing elevated TDS and cyanide concentrations is a registered contaminated site.

9.4.2.4 Detailed Design

9.4.2.4.1 Gidji I TSF

The Gidji I TSF (NAF) is likely to have been completely used up as construction of the Gidji II TSF walls by closure, and is likely to be a low level footprint of material. Draft design criteria for Gidji I TSF are presented in Table 9-49.

Table 9-49: Gidji I TSF draft design criteria

ASPECT	CONCEPT TARGET	DESIGN CRITERIA	BASIS OF CRITERIA
Top Surface Geometry (for each TSF)	Water shedding design	Surface cap aim is to provide dust suppression of tailings and encapsulate tailings / tailings footprint	Contaminated Sites, wind & water erosion encapsulation requirement
Capping and surface cover	Suitable capping material growth media if available	Surface cap aim is to provide dust suppression of tailings and form a low permeability layer reducing water ingress	Contaminated Sites, wind & water erosion encapsulation requirement
'Embankment' slopes (if applicable)	If embankment slopes exist, slopes to be erosionally stable in the long-term	Embankment slope of 1V:3H (approximately 14°), nominally 0.5 m rock armour applied	Landloch 2020 Golder experience
Geotechnical stability (if applicable)	Slopes and facility to be geotechnically stable in the long-term	Factor of safety >1.5 under long term static loading Factor of safety ≥1.0 after a 1:10000 annual exceedance probability (AEP) seismic event (~MCE)	ANCOLD 2019
Closure Strategy and TSF design storms	Surface water is managed to maintain landform stability for the prescribed PMP and ARI event	500-year annual recurrence interval (ARI) event (Design Storm conveyance)	ANCOLD 2012 Existing KCGM TSF closure designs

9.4.2.4.2 Gidji II TSFs

The geochemical nature of the Gidji TSF material is the primary driver for design decisions. A technical summary of design work to date is provided in Appendix 5.14.

The current proposed closure design for Gidji II is a water retaining design with the following components:

Inner basin surface

- Upper surface / basin interior of the Gidji TSF
- A nominally 0.3 m drainage (capillary break) layer
- A low permeability layer (as identified above)
- Approximately 0.5 – 1.0 m general fill material (subsoils and more erodible topsoils, probably Class D materials)
- Nominally 0.15 – 0.2 m of growth media topsoil material (class B materials)

Soils in the vicinity of the Gidji TSF are not ideal rehabilitation materials, with some being sodic and prone to erosion. The designs are based primarily on geochemical and erosion reasoning, with the available soils matched as best possible to the design requirements.

The acidic nature of the Gidji II tailings results in an environment that is not supportive to vegetation establishment. The introduction of a capillary break adds a buffer layer to protect root penetration into the tailings, allowing for continued vegetation growth within the cover system (Golder, 2020).

The water retaining cover layer (made up of Class D or other similar material) allows for controlled infiltration of surface water to the tailings over time. This cover system also allows for evaporation of surface water in the event of significant rainfall events. Due to the slow infiltration of water through the cover layer, excess water will need to be evaporated to maintain cover system functionality. Further work is required to be completed in this area to confirm the cover, the storage and capillary break layer thicknesses, and confirmation of the long term water balance.

The outcomes of trade-off studies (Golder, 2020) indicated the preferential options to progress with the design, considering the inherent risk assessment, contextual knowledge basis, financial impact, environmental impact, and technical/constructability compliance, was a water holding design. Design options that were identified as fatally flawed, regardless of how high their assessment scores were, were not considered further.

The outcome of the trade-off study was to progress a water retaining cover system. Outcome of the second trade-off study was to further assess the need for, and composition of, a possible low permeability layer that would form part of the water retaining cover system.

Based on the closure objectives and trade off studies, three options for the low permeability layer were identified for further investigation – compacted tailings, synthetic liner (HDPE/LLDPE) or bituminous geomembrane liner (BGM).

External outer slopes

- Nominally 0.5 m competent rock capping (sourced from Fimiston or another suitable mine site)
- Nominally 0.15 – 0.2 m of growth media – topsoil material most suited to placement on external slopes

With consideration of the inherent geochemical and physical properties of the tailings material, two trade-off studies (provided in Appendix 5.14) were undertaken to determine key aspects of the closure design:

- Assessment of the cover system concept;
- Assessment of the low permeability layer as part of the cover system.

Draft design criteria for Gidji II TSFs are presented in the below table 9-50.

Table 9-50: Gidji II TSF Draft Design Criteria

ASPECT	CONCEPT TARGET	DESIGN CRITERIA	BASIS OF CRITERIA
Top Surface Geometry (for each TSF)	Water retaining design that holds the design storm and maintains a vegetated surface	Interior drainage in the TSF supported by a beach slope that is graded to drain away from the outer slopes to promote rainfall runoff towards a low point (previously the decant area).	Trade Off 1 and Trade Off 2 design workshops Golder experience
Interior surface Capping and surface cover	• Possible Low permeability cover between tailings surface and cover material • capillary break material over tailings • general fill material • growth media	Net percolation to be below 1% of mean annual precipitation (MAP). Surface cap aim is to provide dust suppression of tailings and form a low permeability layer reducing water ingress	Trade Off 1 and Trade Off 2 design workshops Golder experience Erosion model (completed by Landloch as part of this assessment)
Perimeter Bund	Minimum bund height to be designed to provide stable containment for the design storm event (the 24- hour PMP)	Bund material to be capped with competent rock	Existing KCGM TSF closure designs KCGM MCP 2018
External embankment slopes	Slopes and facility to be erosionally stable in the long-term	Embankment slope of 1V:3H (approximately 14°), nominally 0.5 m rock armour applied Growth media placement of nominally 150 to 200 mm of rehabilitation materials, ripped into waste rock.	Landloch 2020 Golder experience
Geotechnical stability	Slopes and facility to be geotechnically stable in the long-term	Factor of safety >1.5 under long term static loading Factor of safety ≥1.0 after a 1:10000 annual exceedance probability (AEP) seismic event (~MCE)	ANCOLD 2019
Closure Strategy and TSF design storms	Contain precipitation from the design containment storm event on the interior surface. Surface water is managed to maintain landform stability for the prescribed PMP and ARI event	24-hour probable maximum precipitation (PMP) event for upper surface (Design Storm containment) 500-year annual recurrence interval (ARI) event (Design Storm conveyance)	ANCOLD 2012 Existing KCGM TSF closure designs

9.4.2.4.3 Availability of Rehabilitation Resources

There is an existing topsoil stockpile at Gidji TSFs. In general, the soils at Gidji are of a poor quality and are sodic, thus they are prone to erosion and tunneling. From test work, soils are generally of 2 types, sodic gradational or sodic soils. The sodic gradational soils are more suited to application on embankment slopes. Between 260,000 and 341,000 m^3 of general growth media fill material will be required for the water retaining material in the basin (between the capillary break and the topsoil), which will be sourced from the subsoil in a local borrow location. A material balance is provided in Table 9-51. There is a negative balance for the water retaining layer material, this material can be easily supplemented from local borrow, and can be a sub or topsoil. An estimated 558,966m^3 of competent waste rock will be required to cap the Gidji TSFs. The waste rock material will be sourced from Fimiston (current plan) or another suitable source (if suitable and a shorter haulage distance).

Table 9-51: Gidji TSF Rehabilitation Material Balance

TSFs / Stockpiles	Volume growth media (m3)		
	Material suitable for Flat areas upper revegetation layer	Material suitable for Slope areas upper revegetation layer	Material suitable for water retaining layer (0.5m thick)
Gidji II design requirements (water retaining design)	47,754	11,195	119,386
Gidji I requirements (if still a TSF, water shedding design)	27,437	3,439	-
Total design required for TSFs	**75,191**	**14,634**	**119,386**
Class B topsoil available in current TSF stockpiles	86,837	11,646	
Class D topsoil available in current TSF stockpiles			12,898
Remaining / shortfall	11,646 -	2,988 -	106,488
Comments	Sufficient for design implementation	Small shortfall of topsoil	Shortfall of material; will need to from local borrow

TSFs / Stockpiles	Volume growth media (m3)		
	Surface area (Gidji I & II)	Thickness	Volume required
Estimated rock capping required	449,122	0.5	224,561
Comments			Sourced from off site

9.4.2.5 Closure Implementation Status

9.4.2.5.1 Completed Tasks and Studies

Table 9-52: Completed Tasks and Studies for Gidji TSF Domain

TSF	STATUS	WORK COMPLETED 2015-2018	WORK COMPLETED 2019-2022
Gidji I TSF	Active TSF	• Contaminated Sites risk ranking process completed; • Abstraction of groundwater has continued (associated with Gidji I TSF); • Closure strategy, engineering and soil studies. Draft design criteria developed.	• Completed closure design work for Gidji TSF complex; However a change to LOM plans for future TSF cells has resulted in this work requiring a review • Further erosion studies for external embankments, including development of specific soil parameters
Gidji II TSF	Active TSF	• Contaminated Sites risk ranking process completed; • Closure strategy, engineering and soil studies. Draft design criteria developed.	• Completed closure design work for Gidji TSF complex; However a change to LOM plans for future TSF cells has resulted in this work requiring a review

9.4.2.5.2 Planned Tasks and Studies

For scheduling details on Tasks please refer to Section 9.7.3

Table 9-53: Planned Tasks and Studies for Gidji TSF Domain

TASK	TARGET COMPLETION DATE/PERIOD
Update TSF complex closure design work reports	Next MCP cycle (2-3 yrs time)
Further water balance studies for Gidji II TSF design (long term field trial)	Long term project; estimated completion MCP 2028
Detailed designs, once further water balance information is known	Within 5 years from closure

TASK	TARGET COMPLETION DATE/PERIOD
TSF Decommissioning Plan	6 months prior to decommissioning of TSF
Groundwater assessment (as part of TSF Decommissioning Plan)	At decommissioning
Final TSF Report incl. verification water management features to specification	At decommissioning of TSF

9.4.2.5.3 Planned Rehabilitation Activities

Rehabilitation of Gidji TSF Domain is scheduled for after Gidji Mineral Processing is complete.

For the timing of Rehabilitation Activities, please refer to the consolidated Schedule of Activities in Section 9.7.

Table 9-54: Planned Rehabilitation Activities for Gidji TSF Domain

FEATURE	APPROACH
Gidji I, Gidji II	• Remove piping, decant pumps and other infrastructure; • Allow sufficient drying time (approx. 2-3 years); • Profile outer embankments of landform to reduce long term erosion and promote stability; • Cover outer slopes and surfaces with appropriate waste rock; • Upper surface to be reshaped for water control and capped with appropriate material for dust management; • Implement water shedding design; • Cross rip and seed with native species if identified for revegetation; • Maintain fencing to restrict access until relinquishment (or no longer required); • Continue seepage and groundwater abstraction until monitoring confirms that active management is no longer required; and • Backfill all seepage trenches and ponds when no longer required.

9.4.2.6 Information Gaps

Further studies are required to underpin detailed design project for Gidji II:

- Further water balance studies for Gidji II TSF design (field trial and data analysis);
- Detailed closure designs for the TSFs (after water balance and other input data acquired).

9.4.2.7 Key Tasks for Premature Closure

An overarching strategy for Premature Closure is described in Section 9.1.3.

For premature closure, Gidji TSFs would no longer receive tailings slurry. They would receive a smaller volume of flushing water when the tanks and piping at Gidji Plant were flushed. The tailings lines would also be flushed out. Pumps and other water infrastructure would remain operational, and tailings dam freeboard would require management. Excess water would potentially be circulated within the piping system or saline water dams could be used as part of holding strategy, or moved to Fimiston's larger facilities. Geotechnical monitoring of the TSFs would continue. A decision would need to be made on whether the site was moving into Care and Maintenance or the intention was to restart operations or sell the operation. An assessment conducted during the Covid 19 pandemic found that no immediate action was required to manage the PAF TSFs during a Care and Maintenance phase. Should this restart of operations not eventuate, closure works described in the Section 9.4.2 would be implemented.

9.5 Mt Percy Closure Domains

Mt Percy Operational Area is currently in Care and Maintenance. Mt Percy is located on vacant crown land, adjacent to the City of Kalgoorlie-Boulder. The domain is surrounded by a diamond mesh fence on the western side and a 5 strand barb wire on the eastern side.

This section outlines remaining planned closure activities for Mt Percy, in order to ensure that the requirements of the closure objectives and post closure land use are met. Most of the required rehabilitation works at Mt Percy have been completed. The standard decommissioning and rehabilitation approach has been tabulated in Table 9-55, with further detail on high risk areas/areas of interest provided.

Areas in Table 9-55 that are simple to rehabilitate and pose a low risk, such as laydowns, tracks, powerlines and water management facilities are not discussed in further detail, but will be rehabilitated to the using the standard decommissioning and rehabilitation approach described in Table 9-68.

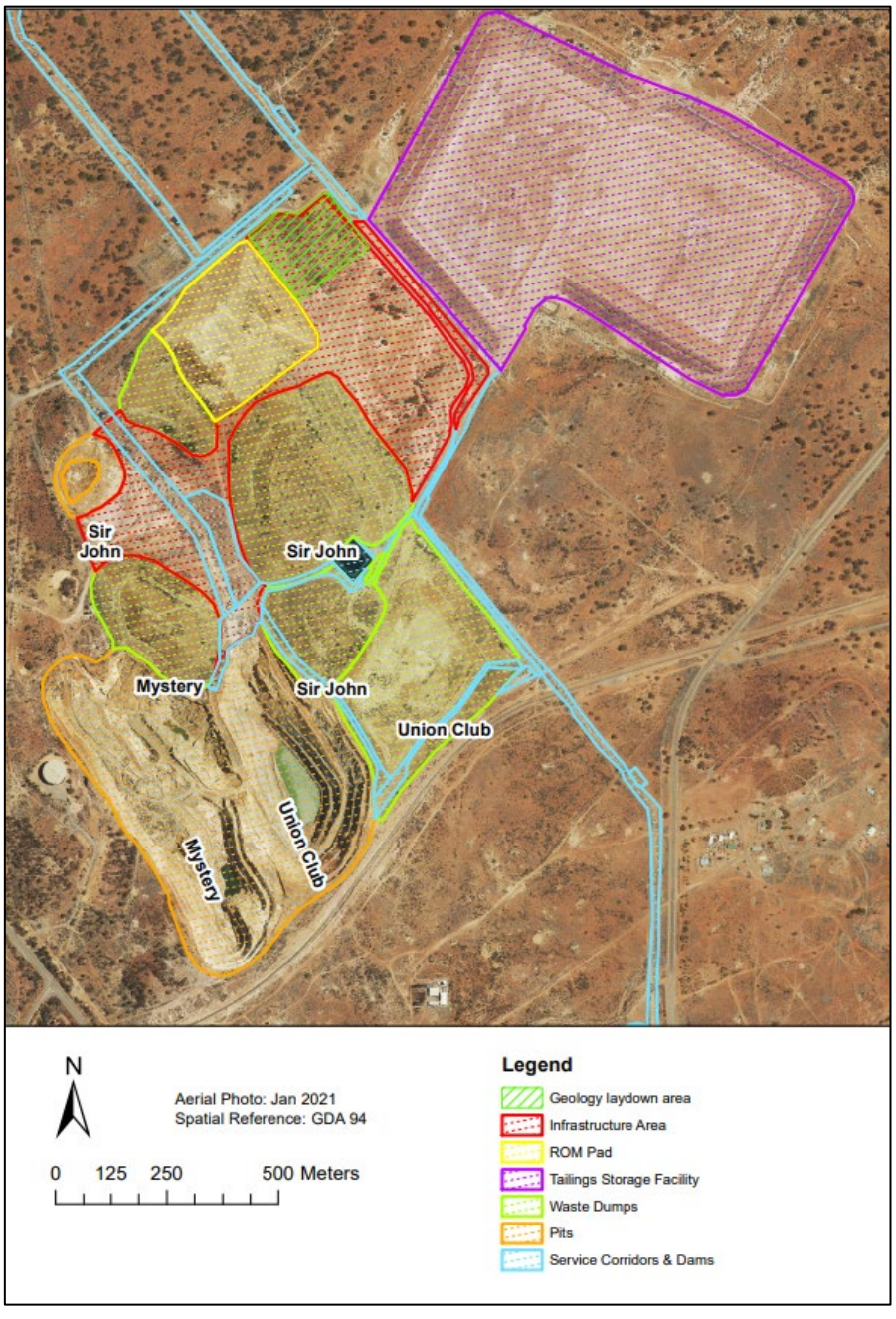


Figure 9-46 Mt Percy Operational Area

Table 9-55: Standard Decommissioning and Rehabilitation Approach for Mt Percy Domain

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
Domain: Mining Infrastructure		
Mystery, Union Club and Sir John Open Pit	• Implement risk based approach to prevention of inadvertent access in open pit areas, as required by Mines Safety and Inspection Regulations 1995 (abandonment bunding and/or other measures); and • Paddock dump waste on upper pit access ramps to limit vehicle access; retain emergence access if safe.	Restricted access due to safety
Ore Stockpiles and ROM Pads	• Rehabilitation completed; • Site verification inspection of completed rehabilitation works.	Modified landscape
Laydowns	• Rehabilitation completed; • Site verification inspection of completed rehabilitation works.	Modified landscape
Domain: Waste Dumps		
Union Club, Mystery	*For existing rehabilitation:* • Specifications in alignment with original approvals; and • Site verification inspection of completed rehabilitation works.	Modified landscape
Domain: Mineral Processing Infrastructure		
Plant and Support Infrastructure	• Investigate potential contamination for registered contaminated sites; and • Site verification inspection of completed rehabilitation works.	Modified landscape
Domain: Tailings Storage Facilities		
Mt Percy TSF	• Rehabilitation completed; • Construction of robust crest bunds; • Maintain fencing to restrict access to landform until relinquishment; and • Site verification inspection of completed rehabilitation works.	Modified landscape Potentially fenced for Restricted access

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
Domain: Water Abstraction and Containment Facilities		
Lined Water Storage Dams (Regional Domain)	• Slash liner and bury during backfilling of dam; • Reshape surface where required; and • Rip on the contour and seed with native species if the area is identified for revegetation.	Modified landscape
Monitoring Bores	• Bores (at TSF) were decommissioned as per DWER guidelines; DWER Licence closed out.	Modified landscape
Pipelines (Regional Domain)	• For above ground pipelines, flush, remove and sell or recycle where possible, unless specified otherwise by appropriate approvals; • For buried pipelines, flush and leave buried unless they pose a future risk; and • Reinstate areas along pipelines and re-vegetate as appropriate.	Modified landscape
Roads and Tracks	• If required., remove windrows and reinstate natural drainage function; • Rip sealed roads and dispose of material appropriately. • Rip unsealed roads unless specified otherwise by appropriate approvals; and • Rip and seed with native species.	Modified landscape

9.5.1 Mt Percy Mining Infrastructure Domain

9.5.1.1 Description of the Domain

Features of the Mining Infrastructure Domain at the Mt Percy Operational Area include the Mystery and Union Club Open Pit and Sir John Open Pit (Figure 9-47). Most of the mining at Mt Percy occurred pre KCGM ownership, with the area rehabilitated by 2001.

Figure 9-47: Mt Percy Open Pits and Surrounding Infrastructure

9.5.1.2 Applicable Land Use Outcomes

9.5.1.2.1 Post Mining Land Use and Closure Criteria

The post closure land use for Mt Percy is rehabilitated modified landscape, with restricted access due to safety for the Mining Infrastructure Domain. Mt Percy is located on vacant crown land, adjacent to the City of Kalgoorlie-Boulder. The domain is surrounded by diamond mesh fencing on the western side and 5 strand barb wire on the eastern side.

Table 9-56: Mt Percy Mining Infrastructure Domain Completion Criteria

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe	Inadvertent access is restricted as much as practicable to any landforms or structures that are considered unsafe.	Limit ability of vehicular traffic to travel over crests through construction of adequately sized and positioned crest bunds on all possibly unsafe mine structures identified through area specific assessment. Incorporation of requirement into closure designs and planning. Fauna egress considered in design.	Mine waste landforms/ excavations	Crest / safety bunds constructed on any remaining excavation/ trench/channel/pit/embankment/ landform with slopes exceeding 25 degrees or depth exceeding 0.5 m.	Confirmation of construction of safety measures through visual inspection and/or aerial images.
		Construction of abandonment bunding around mine open pits	Open Pits Mt Percy	Pit abandonment bunding complies with Mines Safety and Inspection Regulations 1995 and DMIRS 1997 Guidelines (DOIR 1997) requirements.	Abandonment / safety bund completion recorded in MCP or associated close out documents – assessment via aerial photography / DTM or site inspection by suitable professional.
		Proactive management of existing (historical) mine waste landforms and infrastructure that are located within the zone of instability of open pits. Identification and assessment (as to the WRD instability risks should portions of the landform collapse into the pit) of landforms that are within the mine pit instability zone is by suitably qualified professional such as a geotechnical engineer. Calculation of pit zone of instability allows for geotechnical instability and erosion.	Open Pits Mt Percy	Geotechnically high risk unstable areas/mine structures/zones are captured within abandonment bunding/ safety bunds.	Completion of final assessment at end of mining operations recorded in MCP or associated closeout report. Submission of Final Relinquishment Report to DMIRS geotechnical engineers.
			Mine waste landforms	Any (older) mine waste landforms located or partially located within long term mine pit instability zone to have competent abandonment bund/s	Certification of compliance based on aerial photography / DTM and site inspection by suitable professional recorded in Final Relinquishment Report.

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
				designed and implemented based on area specific assessment to restrict vehicle access to safe area of landform.	
		Retain emergency access ramp for pit, with reasonable danger/hazard warning signage.	Mt Percy Open Pits	If safe, retain pit access ramp for geotechnical monitoring during post closure monitoring and emergency access to pit lakes, with reasonable danger/hazard warning signage.	Photographic evidence provided in MCP or associated close out documents.
Geo-Physically Stable	Open Pit wall geotechnical stability will be managed	Open Pit wall designs will have appropriate geotechnical considerations and design criteria.	Mt Percy Open Pits	Open Pit wall movement not to exceed rates which could compromise the calculated zone of instability.	Geotechnical post closure monitoring methods as recommended by qualified Geotechnical Engineer. Final geotechnical zone of instability assessment report by qualified Geotechnical Engineer after post mining monitoring period, with recommendations actioned. Submission of close out report to DMIRS geotechnical engineers.

9.5.1.3 Closure Strategy

Mining occurred at the Mt Percy site between 1985 and 1992. Rehabilitation of the site is complete, occurring in 1998, with infrastructure removed at this time. The area is still considered prospective with known mineralised zones under the Mystery and Union Club Open Pits.

Safe – Prevent Inadvertent Access & management of older WRDs

Inadvertent public access to the Mt Percy Open Pit after closure was one of the risks identified for KCGM. The *Mines Safety and Inspection Regulations 1995* require a risk based approach to prevention of inadvertent public access of the pit or other mining features. The abandonment strategy for Mt Percy was updated in 2020, with a location of the abandonment bund proposed after the existing buttress designs were reviewed.

KCGM intends to review existing approved plans for pit abandonment at Mt Percy when developing the Open Pit Abandonment Strategy.

At present Mt Percy has a fence with security patrols in place. To achieve long term prevention of inadvertent vehicular and pedestrian access to the Mining Domain, an abandonment bund is required at the Mt Percy pits. This can be constructed with oxide from Mt Percy, or with competent rock from Fimiston.

In addition, 2 WRDs, Mystery and Union Club, are potentially within the zone of instability. The proposed abandonment bund location has taken this into consideration (Figure 9-48).

Safe – Long term geotechnical stability

For long term pit wall stability for the current pit shell at Mt Percy, 3 buttresses will be required, on the western and southern walls. Implementation of these buttresses will be undertaken to comply with the DMIRS geotechnical guidelines should a suitable alternative not be implemented.

Geotechnical monitoring of the pit walls has occurred for a period of 20 years, with no significant movement identified. Current assessment of pit walls, from regular geotechnical inspections, is that the materials exposed in the south walls of the open pits are competent, and with the tight slope curvature and the presence of well-defined rock structure, a circular failure mechanism is considered to be unlikely. Minor slips have occurred in less favourable materials on the northern side of Mystery pit and eastern wall of Union Club pit. Implementation of buttressing is scheduled to occur later in LOM, as the area is prospective and may be mined again.

Figure 9-48: Zone of instability, Abandonment bund and Buttressing for current Mt Percy pit shells

9.5.1.4 Rehabilitation Materials

There are currently no unused rehabilitation materials at Mt Percy.

9.5.1.5 Closure Implementation Status

9.5.1.5.1 Completed Closure Tasks and Studies

Table 9-57: Completed Tasks and Studies for Mt Percy Mining Domain

FEATURE	STATUS	WORK COMPLETED 2015-2022
Mt Percy Mining Infrastructure	Decommissioned and demolished	• Contaminated Sites risk ranking process completed.
		• Open Pit Abandonment Strategy: Site inspection, re-evaluated abandonment bund position, review of pit buttressing design
		• Pit wall stability monitoring – Geotechnical inspections (quarterly)

9.5.1.5.2 Planned Closure Tasks and Studies

For scheduling details on Tasks please refer to Section 9.7.4.

Table 9-58: Planned Tasks and Studies for Mt Percy Mining Domain

TASK	TARGET COMPLETION DATE/PERIOD
Open Pit Abandonment Strategy – further geotechnical evaluation	2024 MCP
Pit wall stability monitoring – Geotechnical inspections	Ongoing (quarterly)

9.5.1.5.3 Planned Rehabilitation Activities

For the timing of Rehabilitation Activities, please refer to the consolidated Schedule of Activities in Section 9.7.4.

Table 9-59: Planned Rehabilitation Activities for Mt Percy Mining Domain

Feature	Approach
Mystery, Union Club and Sir John Open Pit	• Implement risk based approach to prevention of inadvertent access in open pit areas, as required by Mines Safety and Inspection Regulations 1995 (abandonment bunding and/or other measures). • Paddock dump waste on upper pit access ramps to limit vehicle access.
Ore Stockpiles and ROM Pads	• Rehabilitation completed; • Contaminated sites assessment

9.5.1.6 Key Tasks for Premature Closure

An overarching strategy for Premature Closure is described in 9.1.3.

Mt Percy is already in Care and Maintenance. Should the whole of KCGM enter a period of premature closure, a decision would need to be made on whether the site was moving into Care and Maintenance, or the intention was to restart operations or sell the operation. Should this not eventuate, essential closure works described in Section 9.5 would be implemented.

9.5.2 Mt Percy Waste Rock Dumps Domain

9.5.2.1 Description of the Domain

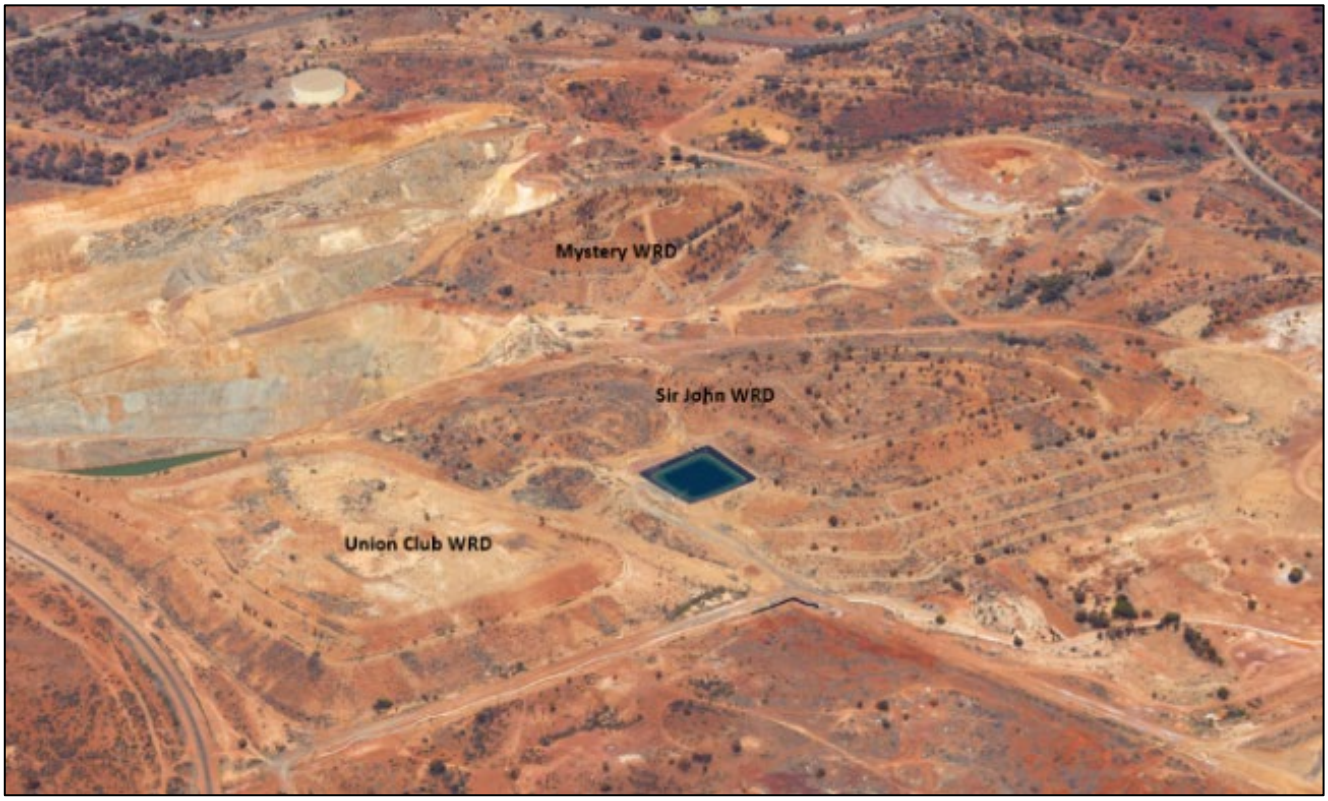


Figure 9-49: Mt Percy WRDs

The Mt Percy WRDs were rehabilitated in the late 1990s, with rehabilitation now more than 20 years old and considered satisfactory. The WRDs at Mt Percy are oxide dumps, very different in nature to the Fimiston WRDs.

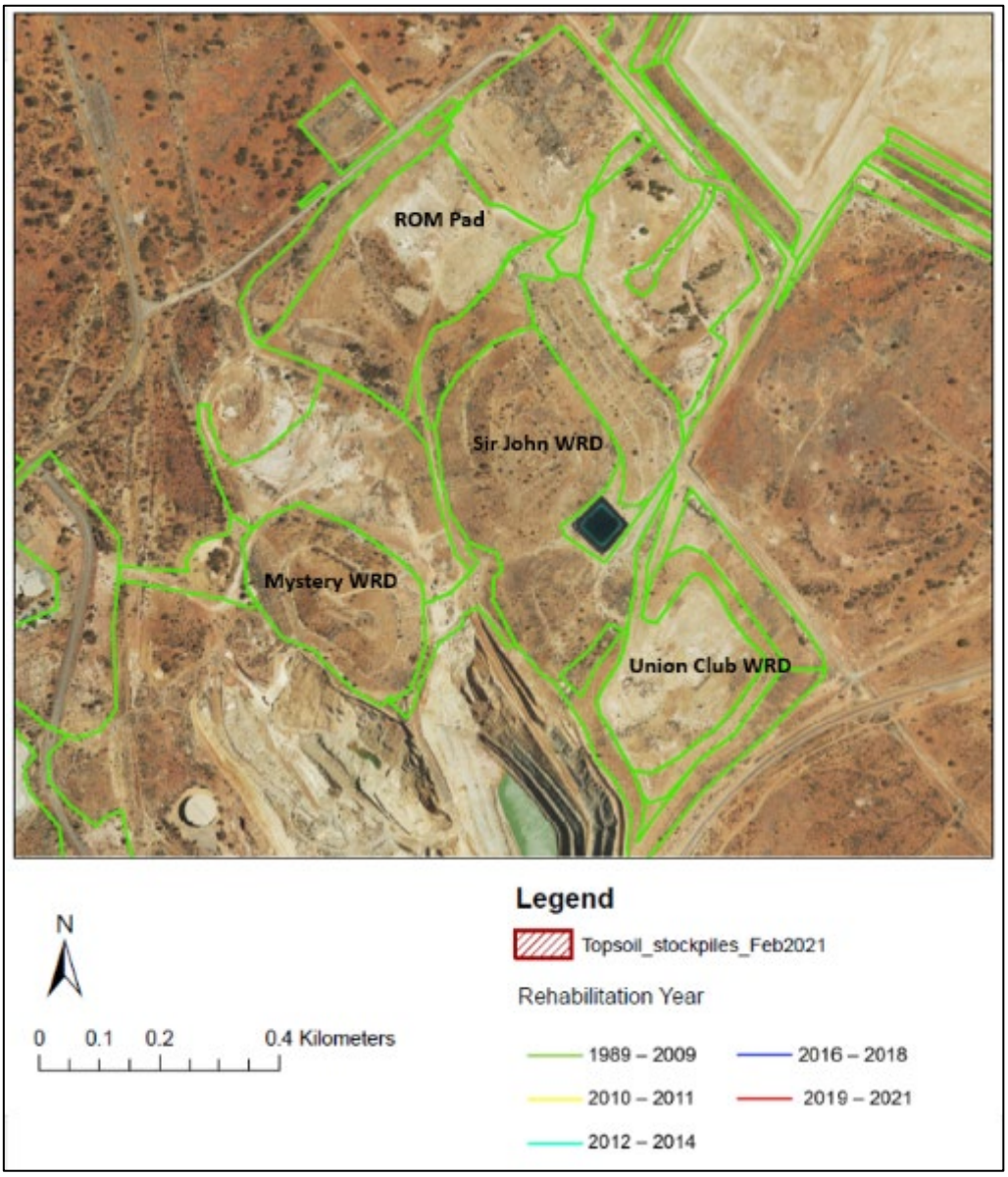


Figure 9-50: Mt Percy WRDs current rehabilitation status (2021)

9.5.2.2 Applicable Land Use Outcomes

9.5.2.2.1 Post Mining Land Use and Closure Criteria

The post closure land use for Mt Percy WRDs is rehabilitated modified landscape. Table 9-60 summarises Completion Criteria relevant to this Domain.

Table 9-60: Mt Percy WRD Domain Completion Criteria

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe	Inadvertent access is restricted as much as practicable to any landforms or structures that are considered unsafe.	Limit ability of vehicular traffic to travel over crests through construction of adequately sized and positioned crest bunds on all possibly unsafe mine structures identified through area specific assessment. Incorporation of requirement into closure designs and planning. Fauna egress considered in design.	Mine waste landforms/ excavations	Crest / safety bunds constructed on any remaining excavation/ trench/channel/pit/embankment/ landform with slopes exceeding 25 degrees or depth exceeding 0.5 m.	Confirmation of construction of safety measures through visual inspection and/or aerial images.
			Mine waste landforms	Any (older) mine waste landforms located or partially located within long term mine pit instability zone to have competent abandonment bund/s designed and implemented based on area specific assessment to restrict vehicle access to safe area of landform.	Certification of compliance based on aerial photography / DTM and site inspection by suitable professional recorded in Final Relinquishment Report.
Geo-Physically Stable	Mine landforms achieves long term geotechnical stability.	Implementation of site appropriate geotechnically stable designs for mine waste landforms. Final batter slope angle selection dependent on landform materials properties and cover material properties.	Mine waste landforms	Mine waste rock dumps and TSFs have slopes of <25 degrees (excluding buttressed areas).	Assessment at end of operations to ensure slopes are battered down and stable through site inspections or DTMs, recorded in MCP or associated closeout report.
	Long term erosion stability and integrity of engineered mine landform covers based geomorphological processes observed within the local region.	Effective landform surface drainage control measures based on landform water retaining designs.	WRDs	Appropriately implemented surface water management structures on TSFs as per ANCOLD 2019 Guidelines. Rehabilitation implementation meets design intent with appropriately implemented surface water management structures on WRDs i.e. erosion resistant design has water catchment on benches and water retaining design slope cover.	Design and implementation verified by suitably qualified engineer and recorded in MCP or associated close out documents.

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Geo-Physically Stable		Where possible restrict access to rehabilitated mine waste landforms by human traffic and domestic livestock grazing to minimise potential for damage to constructed covers.	Mine waste landforms	Where required and practicable, access to rehabilitated landforms is to be limited through the use of fences or rock bunds.	Site inspection records (including photographs and GIS mapping) to verify installation of fences to limit access recorded in MCP or associated close out documents.
Non Polluting		Minimisation of sediment movement from the immediate footprint of mine landforms through use of effective covers, drainage control and toe sediment retention bunds.	Mine waste landforms (WRDs)	Mine waste landforms do not actively discharge alluvial fans into adjacent natural drainage lines (creeks). No discharge of sediment or contaminants of concern beyond the assimilative capacity of the local environment based on Australian Standards.	Aerial photography verification of no active alluvial fans extending beyond the immediate foot print of mine waste landforms. Action if identified. Relevant post closure groundwater and surface runoff monitoring data.
Sustainable Land Use	Rehabilitate disturbed areas to a modified landscape receptive to vegetation regrowth and recovery over time considering visual amenity and properties of available rehabilitation materials.		Mt Percy	Mt Percy operational area revegetation has values indicative of the agreed post mining land use, modified landscape, accounting for limitations of the available materials used in rehabilitation.	Rehabilitation performance monitoring using accepted vegetation monitoring techniques and measures. Includes assessment against targets values, and demonstration of the ability to become self-sustaining (as detailed in Section 10).

9.5.2.3 Closure Strategy

Mt Percy WRD have been rehabilitated for almost 20 years and are in the monitoring phase.

Safe – Prevent Inadvertent Access & management of older WRDs

Inadvertent public access to the Mt Percy WRDs within the zone of potential instability is an identified risk. The *Mines Safety and Inspection Regulations 1995* require a risk based approach to prevention of inadvertent public access of the pit or other mining features.

At present Mt Percy has a fence with security patrols in place. To achieve long term prevention of inadvertent vehicular and pedestrian access to the Mining Domain, an abandonment bund is required at the Mt Percy pits. This can be constructed with oxide from Mt Percy, or with competent rock from Fimiston.

In addition, 2 WRDs, Mystery and Union Club, are potentially within the zone of instability. The proposed abandonment bund location has taken this into consideration (Figure 9-48).

The Mt Percy WRDs have been rehabilitated, with earthworks and revegetation undertaken. Due to current performance of rehabilitation, it is not envisaged that any further major works will be required.

9.5.2.4 Availability of Rehabilitation Resources

There are no remaining topsoil stockpiles at Mt Percy WRDs.

9.5.2.5 Closure Implementation Status

9.5.2.5.1 Completed Tasks and Studies

Table 9-61: Completed Tasks and Studies for Mt Percy WRD Domain

MT PERCY WRD	STATUS	REHABILITATION ACTIVITIES COMPLETED 2018-2022
Union Club WRD	Closed	Rehabilitation complete, in monitoring phase; Vegetation monitoring undertaken – completion criteria assessment
Mystery WRD	Closed	Rehabilitation complete, in monitoring phase; vegetation monitoring undertaken – completion criteria assessment

9.5.2.5.2 Planned Tasks and Studies

For scheduling details on Tasks please refer to Section 9.7.

Table 9-62: Planned Tasks and Studies for Mt Percy WRD Domain

TASK	TARGET COMPLETION DATE/PERIOD
WRD Completion Criteria assessment – Site verification inspection	MCP 2024

9.5.2.5.3 Planned Rehabilitation Activities

For the timing of Rehabilitation Activities, please refer to the consolidated Schedule of Activities in Section 9.7.4

Table 9-63: Planned Rehabilitation Activities for Mt Percy WRD Domain

FEATURE	APPROACH
All WRD	N/a

9.5.2.6 Key Tasks for Premature Closure

An overarching strategy for Premature Closure is described in 9.1.3.

For premature closure, Mt Percy WRDs would be considered completed, with no further work required.

9.5.3 Mt Percy Tailings Storage Facility Domain

9.5.3.1 Description of Domain

The Mt Percy TSFs are more than 30 years old, and were rehabilitated in the early 2000's, using oxide material from the upper lift of Union Club WRD.

Figure 9-51: Mt Percy TSF (2021)

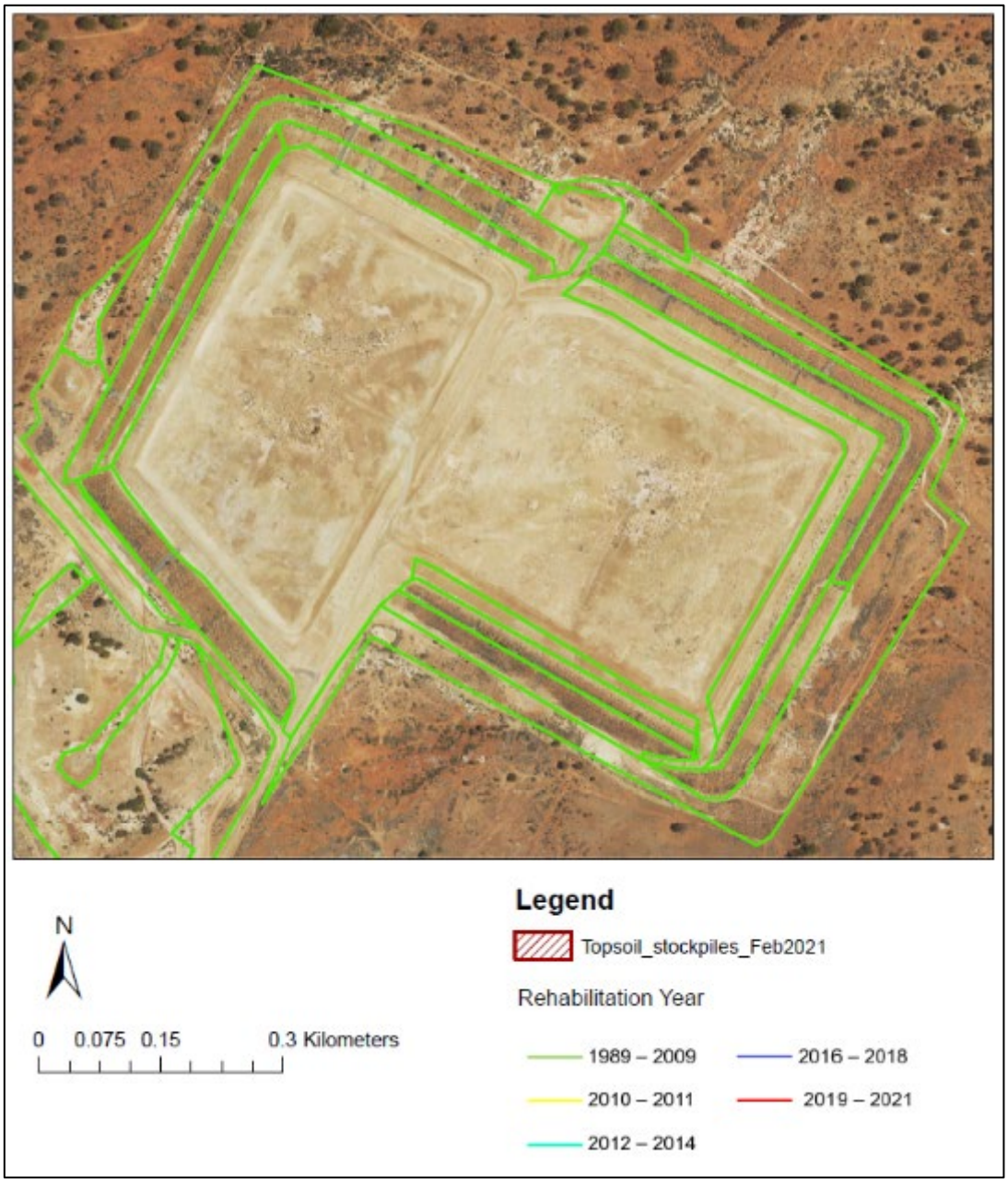


Figure 9-52: Mt Percy TSF current rehabilitation status (2021)

9.5.3.2 Applicable Land Use Outcomes

9.5.3.2.1 Post Mining Land Use and Closure Criteria

The post closure land use for Mt Percy TSFs is rehabilitated modified landscape, with limited access due to safety.

Table 9-64: Mt Percy TSF Domain Completion Criteria

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe		Limit ability of vehicular traffic to travel over crests through construction of adequately sized and positioned crest bunds on all possibly unsafe mine structures identified through area specific assessment. Incorporation of requirement into closure designs and planning. Fauna egress considered in design.	Mine waste landforms/ excavations	Crest / safety bunds constructed on any remaining excavation/ trench/channel/pit/embankment/ landform with slopes exceeding 25 degrees or depth exceeding 0.5 m.	Confirmation of construction of safety measures through visual inspection and/or aerial images.
Geo-Physically Stable	Mine landforms achieves long term geotechnical stability.	Implementation of site appropriate geotechnically stable designs for mine waste landforms. Final batter slope angle selection dependent on landform materials properties and cover material properties.	Mine waste landforms	Mine waste rock dumps and TSFs have slopes of <25 degrees (excluding buttressed areas).	Assessment at end of operations to ensure slopes are battered down and stable through site inspections or DTMs, recorded in MCP or associated closeout report.
	Long term erosion stability and integrity of engineered mine landform covers based geomorphological processes observed within the local region.	Effective landform surface drainage control measures based on landform water retaining designs.	TSFs	Appropriately implemented surface water management structures on TSFs as per ANCOLD 2019 Guidelines. Rehabilitation implementation meets design intent with appropriately implemented surface water management structures on WRDs i.e. erosion resistant design has water catchment on benches and water retaining design slope cover.	Design and implementation verified by suitably qualified engineer and recorded in MCP or associated close out documents.
		Where possible, restrict access to rehabilitated mine waste landforms by human traffic and domestic livestock grazing to minimise potential for damage to constructed covers.	Mine waste landforms, especially TSFs	Where required and practicable, access to rehabilitated landforms is to be limited through the use of fences or rock bunds. Perimeter fencing in place around all TSFs.	Site inspection records (including photographs and GIS mapping) to verify installation of fences to limit access recorded in MCP or associated close out documents.

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Non Polluting	The landforms containing materials of concern will be managed to minimise impacts to the quality of the surrounding environment.	Minimisation of sediment movement from the immediate footprint of mine landforms through use of effective covers, drainage control and toe sediment retention bunds.	Mine waste landforms (TSFs)	Mine waste landforms do not actively discharge alluvial fans into adjacent natural drainage lines (creeks). No discharge of sediment or contaminants of concern beyond the assimilative capacity of the local environment based on Australian Standards.	Aerial photography verification of no active alluvial fans extending beyond the immediate foot print of mine waste landforms. Action if identified. Relevant post closure groundwater and surface runoff monitoring data.
		Formulation and implementation of post closure seepage management plan if impacts on the beneficial users of groundwater and vegetation.	TSFs	No discharge of seepage waters that impacts on beneficial use of groundwater. Groundwater levels remain below or at depth targets.	Groundwater level monitoring of appropriately scaled monitoring network, until proposed groundwater depth targets are achieved. Final groundwater closeout report by suitably qualified professional.
Sustainable Land Use	Rehabilitate disturbed areas to a modified landscape receptive to vegetation regrowth and recovery over time considering visual amenity and properties of available rehabilitation materials.		Mt Percy	Mt Percy operational area revegetation has values indicative of the agreed post mining land use, modified landscape, accounting for limitations of the available materials used in rehabilitation.	Rehabilitation performance monitoring using accepted vegetation monitoring techniques and measures. Includes assessment against target values, and demonstration of the ability to become self-sustaining (as detailed in Section 10).

9.5.3.3 Closure Strategy

The Mt Percy TSF has been rehabilitated, with earthworks and revegetation activities undertaken.

Mt Percy WRD have been rehabilitated for almost 20 years, and are in the monitoring phase.

Safe – Prevent Inadvertent Access

Inadvertent public access to the Mt Percy TSFs has been managed through retention of fencing.

Geophysical stability – Long term geotechnical stability

No further geotechnical work is envisaged. Seepage from the TSF ceased approximately 0 to 15 years ago, and the operational licence was closed out. The TSF was inspected by Golders in 2019, with some comments about water management

Geophysical stability – Long term erosional stability

Some erosion occurred due to failed water control. Remedial works were conducted in 2018 to some rock drains, bench drainage and the crest was backsloped.

Sustainable Land Use - Rehabilitation

The Mt Percy TSFs have been rehabilitated for approximately 20 years, with earthworks and revegetation completed. Due to current performance of rehabilitation, it is not envisaged that any further major works will be required. Monitoring will be conducted as described in Section 10. Vegetation on the upper surface of the TSF has not been as good as expected, this is thought to be due to the properties of the oxide waste used for capping.

9.5.3.4 Rehabilitation Materials

There are no remaining rehabilitation material stockpiles at Mt Percy.

9.5.3.5 Closure Implementation Status

9.5.3.5.1 Completed Closure Tasks and Studies

Table 9-65: Completed Tasks and Studies for Mt Percy TSF Domain

FIMISTON TSF	STATUS	WORK COMPLETED 2018-2022
Mt Percy TSF	Closed	Remedial works to address erosion and water control on the outer embankments and benches; reshaping and compaction of the crest to drain inwards Geotechnical inspection by TSF Engineers, 2019.

9.5.3.5.2 Planned Tasks and Studies

For scheduling details on Tasks please refer to Section 9.7.

Table 9-66: Planned Tasks and Studies for Mt Percy TSF Domain

TASK	TARGET COMPLETION DATE/PERIOD
TSF - Completion Criteria assessment – Site verification inspection	MCP 2024

9.5.3.5.3 Planned Rehabilitation Activities

For the timing of Rehabilitation Activities, please refer to the consolidated Schedule of Activities in Section 9.7.

Table 9-67: Planned Rehabilitation Activities for Mt Percy TSF Domain

FEATURE	APPROACH
Mt Percy TSF	• Rehabilitation completed; • Construction of robust crest bunds; • Maintain fencing to restrict access to landform until relinquishment (or no longer required); • Site verification inspection of completed rehabilitation works.

9.5.3.6 Key Tasks for Premature Closure

An overarching strategy for Premature Closure is described in 9.1.3.

For premature closure, Mt Percy TSFs would be considered completed, with no further work required.

9.6 Regional Closure Domain

This section outlines the standard decommissioning and rehabilitation methods that will be utilised during closure of the Regional area, in order to ensure that the requirements of the closure objectives and post closure land use are met. The standard decommissioning and rehabilitation approach has been tabulated in Table 9-68, with further detail on high risk areas/areas of interest provided in the following section. Areas in Table 9-68 that are simple to rehabilitate and pose a low risk, such as laydowns, are not discussed in further detail.

Table 9-68: Standard Decommissioning and Rehabilitation Approach for Regional Domain

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
Historical, Inactive TSFs		
Mullingar TSF	• Investigate in accordance with *Contaminated Sites Act 2003* and *Contaminated Sites Regulations 2006*; and • Consider remedial options in light of outcomes of investigation and availability of rehabilitation materials.	Modified landscape Restricted access due to Safety
Historical Tailings Wash Area		
Morrison Flats Tailings Area	• Investigate in accordance with *Contaminated Sites Act, 2003* and *Contaminated Sites Regulations 2006*; and • Consider remedial options in light of outcomes of investigation and availability of rehabilitation materials.	Modified landscape
Exploration		
Drill Holes and Sumps	• Rehabilitation completed as part of operations, including removal of sample bags; • Collar and plug hole; • Mound dirt over plugged hole; and • Rip or scarify and seed with native species, if required.	Modified landscape
Tracks and Gridlines	*If the track has been created by mining, with no other users:* • Rip on the contour and seed with native species, if required.	Modified landscape
Groundwater Infrastructure		
Regional Production Borefields (including bores, pipelines and bunds)	*For pipelines:* • For above ground pipelines, flush and remove and sell or recycle where possible, unless specified otherwise by appropriate approvals; • For buried pipelines, flush and leave buried unless they pose a future risk; and • Rip or scarify pipeline routes and re-vegetate as appropriate. *For production bores:* • Retain as required during post closure period; • Once no longer required, decommission as per DWER guidelines; or • Retain and transfer to a third party.	Modified landscape

FEATURE	APPROACH	PROPOSED POST-MINING LAND USE
Access Roads and Service Corridors (Powerlines)	*For powerlines:* • For above ground lines, sell if possible or dispose of unless specified by appropriate approvals; • For buried lines, leave buried unless they pose a future risk; and • Rip or scarify along routes and re-vegetate as appropriate.	Modified landscape
Pipelines	• For above ground pipelines, flush and remove and sell or recycle where possible, unless specified otherwise by appropriate approvals; • For buried pipelines, flush and leave buried unless they pose a future risk; and • Rip or scarify along pipelines and re-vegetate as appropriate.	Modified landscape

9.6.1 Mullingar Tailings Storage Facility

9.6.1.1 Description

Figure 9-53: Mullingar TSF adjacent to Hannans North tourist mine

The Mullingar TSF is the last of the original hand packed TSFs on the Golden Mile. It has been suggested that it should be preserved due to its historic significance. However, Contaminate Sites legislation does not allow for this option, and the TSF will have to be evaluated for other closure options such as capping, removal or reprocessing.

9.6.1.2 Applicable Land Use Outcomes

9.6.1.2.1 Post Mining Land Use and Closure Criteria

The post closure land use for Mullingar TSF will be determined by Contaminated Sites requirements. The TSF is located on crown land, adjacent to the City of Kalgoorlie-Boulder, within a fenced area.

Table 9-69: Completion Criteria for historic TSFs and tailings wash

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Safe	Inadvertent access is restricted as much as practicable to any landforms or structures that are considered unsafe.		Mine waste landforms	Any (older) mine waste landforms located or partially located within long term mine pit instability zone to have competent abandonment bund/s designed and implemented based on area specific assessment to restrict vehicle access to safe area of landform.	Certification of compliance based on aerial photography / DTM and site inspection by suitable professional recorded in Final Relinquishment Report.
Geo-Physically Stable	Long term erosion stability and integrity of engineered mine landform covers based geomorphological processes observed within the local region.	Effective landform surface drainage control measures based on landform water retaining designs.	TSFs	Appropriately implemented surface water management structures on TSFs as per ANCOLD 2019 Guidelines. Rehabilitation implementation meets design intent with appropriately implemented surface water management structures on WRDs i.e. erosion resistant design has water catchment on benches and water retaining design slope cover.	Design and implementation verified by suitably qualified engineer and recorded in MCP or associated close out documents.
Non Polluting	The landforms containing materials of concern will be managed to minimise impacts to the quality of the surrounding environment.	Minimisation of sediment movement from the immediate footprint of mine landforms through use of effective covers, drainage control and toe sediment retention bunds.	Mine waste landforms (TSFs)	Mine waste landforms do not actively discharge alluvial fans into adjacent natural drainage lines (creeks). No discharge of sediment or contaminants of concern beyond the assimilative capacity of the local environment based on Australian Standards.	Aerial photography verification of no active alluvial fans extending beyond the immediate foot print of mine waste landforms. Action if identified. Relevant post closure groundwater and surface runoff monitoring data.

9.6.1.3 Closure Strategy

Closure implementation of this feature will depend on outcomes of Contaminated Sites investigations and recommendations. A drilling programme has been undertaken to investigate the geochemistry and determine whether there is a phreatic level (none was found).

Safe – Prevent Inadvertent Access

Inadvertent public access to the Mullingar TSF has been managed through retention of fencing. This aspect will be addressed once the closure strategy has been determined.

Geophysical stability – Long term geotechnical stability

No further geotechnical work is envisaged. The TSF was inspected by Golders in 2019, with some comments about water management. The TSF has also been inspected by the Fimiston Geotechnical Superintendent several times. There is no short term geotechnical risk while the strategy is formulated.

Geophysical stability – Long term erosional stability

Some erosion occurred due to failed water control. The TSF no longer has crest bunds, and water sheets off to the south during storm events. A gully formed on the western side which was remediated in 2020.

Non polluting – Sediment

The TSF has a sediment halo around its outer embankment which will require remediation.

9.6.1.4 Rehabilitation Materials

There are no rehabilitation materials located at this TSF.

9.6.1.5 Closure Implementation Status

9.6.1.5.1 Completed Closure Tasks and Studies

Table 9-70: Completed Tasks and Studies for Mullingar TSF

FEATURE	STATUS	WORK COMPLETED 2018-2022
Mullingar TSF	Inactive historic TSF	A drilling program was undertaken to understand the geochemistry of the TSF and determine the phreatic level; a phreatic level was not found in the TSF; The material was found to be sub-optimal for reprocessing at Fimiston Processing Plant at this time

9.6.1.5.2 Planned Closure Tasks and Studies

For details on Tasks please refer to the current and planned closure Projects in Section 7.5.1 (Volume 1).

Table 9-71: Planned Tasks and Studies for Mullingar TSF

TASK	TARGET COMPLETION DATE/PERIOD
Contaminated Sites investigation – Geochemical assessment	MCP 2024
Develop remedial options in light of outcomes of geochemical investigation	MCP 2028

9.6.1.5.3 Planned Rehabilitation Activities

Specific rehabilitation actions are unknown until studies are completed.

Historic Voids

Throughout KCGM's tenure, and other land holder's tenure, historic voids (shafts, audits, stopes and other mining features) occur. These historic features often represent a safety hazard. When they occur on KCGM tenure and are considered a risk, they are assessed and remediated as per KCGM's voids department recommendations.

This work is ongoing (often with a higher occurrence after good rainfall). KCGM will remediate these features as part of closure works and will not see Programme of Work or Mining Proposal approvals prior to implementing safety works as this is considered a safety initiative.

Other non-mining tenure holders are responsible for voids on their property, and many, such as the Shire, have existing systems to deal with the historic voids.

For the timing of Rehabilitation Activities, please refer to the consolidated Schedule of Activities in Section 9.7.

9.6.1.6 Key Tasks for Premature Closure

An overarching strategy for Premature Closure is described in 9.1.3.

For premature closure, contaminated site studies would be evaluated to determine if further work was required.

9.6.2 Morrison Flats Tailings Wash Area

9.6.2.1 Description of Domain

Figure 9-54: Morrison Flats Historical Tailings (2021)

Morrison Flats is a historic tailings footprint area left after the Kaltails State Agreement removed the historic TSFs for reprocessing through the former Kaltails processing plant. The State Agreement no longer exists.

9.6.2.2 Applicable Land Use Outcomes

Table 9-72: Completion Criteria for historic TSFs and tailings wash

REGULATORY REQUIREMENT	CLOSURE OBJECTIVE	PROPOSED APPROACH	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT
Geo-Physically Stable	Long term erosion stability and integrity of engineered mine landform covers based geomorphological processes observed within the local region.	Effective landform surface drainage control measures based on landform water retaining designs.	TSFs WRDs	Appropriately implemented surface water management structures on TSFs as per ANCOLD 2019 Guidelines. Rehabilitation implementation meets design intent with appropriately implemented surface water management structures on WRDs i.e. erosion resistant design has water catchment on benches and water retaining design slope cover.	Design and implementation verified by suitably qualified engineer and recorded in MCP or associated close out documents. ***In the case of residual TSF footprints and tailings wash, these measurements may require adjustment and ANCOLD may not apply.***
Non Polluting	The landforms containing materials of concern will be managed to minimise impacts to the quality of the surrounding environment.	Minimisation of sediment movement from the immediate footprint of mine landforms through use of effective covers, drainage control and toe sediment retention bunds.	Mine waste landforms (WRDs TSFs)	Mine waste landforms do not actively discharge alluvial fans into adjacent natural drainage lines (creeks). No discharge of sediment or contaminants of concern beyond the assimilative capacity of the local environment based on Australian Standards.	Aerial photography verification of no active alluvial fans extending beyond the immediate foot print of mine waste landforms. Action if identified. Relevant post closure groundwater and surface runoff monitoring data.

9.6.2.3 Closure Strategy

Closure implementation of this feature will depend on outcomes of Contaminated Sites investigations and recommendations.

Shallow groundwater bores were installed in 2015 and have been monitored biannually since. Due to a particularly dry period since then, the geochemistry data has been inadequate to understand the local pathways.

9.6.2.4 Rehabilitation Materials

There are no rehabilitation materials in the vicinity of this feature.

9.6.2.5 Closure Implementation Status

9.6.2.5.1 Completed Closure Tasks and Studies

Table 9-73: Completed Tasks and Studies for Morrison Flats

FEATURE	STATUS	WORK COMPLETED 2018-2022
Morrison Flats Tailings Wash	Residual material from historic mining	Groundwater monitoring

9.6.2.5.2 Planned Closure Tasks & Studies

For details on Tasks schedule please refer to Section 9.7

Table 9-74: Planned Tasks and Studies for Morrison Flats

TASK	TARGET COMPLETION DATE/PERIOD
Investigate in accordance with *Contaminated Sites Act, 2003* and *Contaminated Sites Regulations, 2006*	Contaminated Sites risk ranking process completed.
Develop remedial options in light of outcomes of investigation and availability of rehabilitation materials	Sampling undertaken; Ongoing

9.6.2.5.3 Planned Rehabilitation Activities

Specific rehabilitation actions are unknown until studies are completed

For the timing of Rehabilitation Activities, please refer to the consolidated Schedule of Activities in Section 9.7.

Table 9-75: Planned Rehabilitation Activities for Morrison Flats

FEATURE	APPROACH
Domain: Historical Tailings Wash Area	
Morrisons Flats Tailings Area	• Investigate in accordance with *Contaminated Sites Act 2003* and *Contaminated Sites Regulations 2006*; • Consider remedial options in light of outcomes of investigation and availability of rehabilitation materials.

9.6.2.6 Key Tasks for Premature Closure

An overarching strategy for Premature Closure is described in 9.1.3.

For premature closure, contaminated site studies would be evaluated to determine if further work was required.

9.7 Schedule of Planned Tasks and Rehabilitation Activities

A schedule of closure planning tasks and rehabilitation activities has been updated, based on the BP2022 LOM Plan. Timeframes will be adjusted to reflect changes in LOM activities and where synergies can be gained through combining work/logistical activities.

Tasks and Studies are scheduled inside closure planning periods of 3 years, between each MCP submission. Some items in the Task List are ongoing and do not necessarily imply a specialist report as an outcome.

9.7.1 Fimiston Operational Area MS:782

9.7.1.1 Fimiston Planned Closure Tasks & Studies – Schedule

Table 9-76: Closure Tasks – Fimiston Operational Area

Operational Area	Domain	Feature	Task	Current Status (2018)	2015 MCP	2018 MCP	2021 MCP	2024 MCP	2027 MCP	2030 MCP	2033 MCP	2036 MCP	2036 - 2039	Post closure
These timelines are based on the KCGM BP2021 LOM Plan														
Fimiston	Mining Infrastructure	Fimiston Open Pit and Sam Pearce Decline	Review Pit lake model and potential groundwater discharge to pit									2034 End of LOM Fimiston Open Pit operations & Mineral Processing		
			Develop Open Pit Abandonment Strategy	3rd party review undertaken; initial planning commenced; this work will take longer than expected - timeline extended										
			Operational and post mining pit wall stability monitoring	Geotechnical inspections completed										
			Further geotechnical assessment of pit wal (Golden Pike area)											
			Scope permitting requirements. Apply for relevant permitting including Groundwater licences for disposal of TSF Seepage water											
			Provide DMIRS with ex pit voids data set											
			Preparation of Final Pit Wall Stability Review											
			Portal & vent shaft seal design and implementation											
	Waste Rock Dumps	Trafalgar Oroya Northern North Eastern Environmental Noise Bund	Refine Visual Amenity concept for WRDs	Complete										
			Waste Dump Closure Planning Strategy, including implementation of a new rehabilitation design	Planning of implementation completed										
			Review of Materials Classification System (erodability focus)	Complete										
			Update Materials Balance Inventory / Rehabilitation Material Reconciliation if new resources available											
			Review of rehabilitation monitoring programme	Monitoring field work completed in 2017										
			Refine completion criteria	Early work associated with vegetation commenced										
			Acquisition of Additional Topsoil	Complete										
			- Trial inspection of verification of landform design implementation to identify process gaps											
			Review Fimiston mining structures compliant with Kalgoorlie Airport OLS at closure	Internal audit of existing WRDs completed in 2017 - compliant										
			Final WRD Report incl. verification water management features to specification											
			Apply for waste disposal and any other permit requirements											

Table 9-77: Closure Tasks – Fimiston Operational Area Continued

Operational Area	Domain	Feature	Task	Current Status (2018)	2015 MCP	2018 MCP	2021 MCP	2024 MCP	2027 MCP	2030 MCP	2033 MCP	2036 MCP	2036 - 2039	Post closure
These timelines are based on the KCGM BP2021 LOM Plan														
	Tailings Storage Facilities	Fimiston I Fimiston II Fimiston IIE Kaltails	TSF Closure Planning Strategy	Further material characterisation erosion work completed; planning for haul road for capping material in progress								2034: End of LOM Fimiston		
			Refine Visual Amenity concept as relates to TSFs	Initial concept completed; requires review										
			Review of Materials Classification System (erodability focus)	Complete; additional samples analysed in 2017										
			Review of rehabilitation monitoring programme	Learnings from WRDs applied to TSF planning										
			Review groundwater status; test groundwater completion criteria (model if required)											
			Develop Closure SGMP (Seepage & G.water management plan)											
			Material characterization studies	Further material characterisation erosion work completed	Stockpiles	Stockpiles	Fim IIE							
			TSF Geotechnical Assessment including Factor of Safety assessment											
			TSF Decommissioning Plan											
			Final TSF Report											
	Mineral Processing Area		Develop detailed demolition Plan											

9.7.1.2 Fimiston Planned Rehabiltation Activites - Schedule

Table 9-78: Rehabilitation Activities – Fimiston Operational Area

Operational Area	Domain	Feature	Approach	Current Status (2018)	2015 - 2018	2018 - 2021	2021 - 2024	2024 - 2027	2027 - 2030	2030 - 2033	2033 - 2036	2036 - 2039	2039- 2042	Post closure
These timelines are based on the KCGM 2021 LOM Plan														
Fimiston MS 782	Mining Infrastructure	Fimiston Open Pit and Sam Pearce Decline	Implement risk based approach to prevention of inadvertent access in open pit areas								2034: End of LOM Fimiston Open Pit operations & Mineral Processing			
			Ongoing tracking of Black Flag and other waste material during operations	Internal tracking of waste on monthly basis, with actions if required										
			Close lookout at the Fimiston Open Pit											
			Paddock dump waste on upper pit access ramps to prevent vehicle access											
			Decommission Fimiston Open Pit dewatering bore and salvage equipment											
		Ore Stockpiles and ROM Pads	Profile outer batters of landform											
			Rip and seed if the area is identified for revegetation											
		Crushing Facilities and Stockpile	Dismantle/demolish all structures; Break up concrete and metal											
			Reshape surface; Rip and seed if the area is identified for revegetation											
		Fuel Farm	Run down fuel levels at completion of post closure activities;											
			Investigate potential contamination											
			Decommission fuel system											
			Decontaminate and make safe prior to demolition											
			Break up concrete and bury or dispose of; Dismantle/demolish all structures; Break up concrete and metal											
			Reshape surface; Rip and seed if the area is identified for revegetation											
		Laydowns	Dispose or recycle remaining items; Break up hard stand areas; Reshape surface; Rip and seed if the area is identified for revegetation											
		Offices, Car parks and Gardens	Break up hard stand areas; Reshape surface; Rip and seed if the area is identified for revegetation											

Table 9-79: Rehabilitation Activities – Fimiston Operational Area Continued

Operational Area	Domain	Feature	Approach	Current Status (2018)	2015 - 2018	2018 - 2021	2021 - 2024	2024 - 2027	2027 - 2030	2030 - 2033	2033 - 2036	2036 - 2039	2039- 2042	Post closure
These timelines are based on the KCGM BP2021 LOM Plan														
Fimiston MS 782	Mining Maintenance Workshops	Mining Maintenance Workshops	Run down consumable levels at completion of post closure activities								2034: End of LOM Fimiston Open Pit operations & Mineral Processing			
			Decommission systems											
			Investigate potential contamination											
			Decontaminate and make safe prior to demolition											
			Break up concrete and bury /dispose; Dismantle/demolish all structures; Break up concrete and metal											
			Break up hard stand areas											
			Reshape surface; Rip and seed if the area is identified for revegetation											
	Waste Dumps	Trafalgar Oroya Northern North Eastern Environmental Noise Bund	Implement the Visual Amenity Concept	Visual Amenity Concept is intergrated into WRD rehabiltation planning; Regulatory approvals received. Implementation in progressive										
			Encapsulation of historic TSFs and TSF footprints that are within the waste dump footprint (Paringa)											
			Conduct progressive rehabilitation on available areas	Progressive rehabilitation conducted in 2015, 2016 and 2017										
	Mineral Processing Infrastructure	Plant and Support Infrastructure	Run down reagent inventory and hydrocarbons prior to closure date											
			Salvage remaining gold from applicable plant											
			Remove buildings and other infrastructure											
			Investigate potential contamination											
			Cyanide decontamination of plant and equipment											
			Decontaminate and make safe prior to demolition											
			Dismantle/demolish all structures; Break up concrete and metal											
			Break up scrap metal and recycle where possible											
			Break up hard stand areas											
			Reshape surface; Rip and seed if the area is identified for revegetation											

Table 9-80: Rehabilitation Activities – Fimiston Operational Area Continued

Operational Area	Domain	Feature	Approach	Current Status (2018)	2015 - 2018	2018 - 2021	2021 - 2024	2024 - 2027	2027 - 2030	2030 - 2033	2033 - 2036	2036 - 2039	2039- 2042	Post closure
These timelines are based on the KCGM BP2021 LOM Plan														
Fimiston MS 782	Tailings Storage Facilities	Fimiston I Fimiston II Kaltails	Remove selected infrastructure								2034: End of LOM Fimiston processing			
			Allow sufficient time for consolidation (est. 2-3 yrs)											
			Profile outer embankments; Cover outer slopes and surfaces with waste rock											
			Upper surface of TSF to be reshaped for water control and capped											
			Construction of robust crest bunds											
			Rip and seed if identified for revegetation											
			Maintain fencing to restrict access or no longer required											
			Continue dewatering until active management is no longer required for groundwater levels											
			Backfill all seepage trenches and ponds when no longer required											
	Tailings Delivery and Decant Water Return Lines (including bunds)	Fimiston I Fimiston II Kaltails	Above ground pipelines: flush and remove and sell or recycle											
			Buried pipelines: flush and leave buried											
			Reinstate areas along pipelines and revegetate as appropriate											
	Water Abstraction and Containment Facilities	Lined Water Storage Dams	Slash liner and bury during backfilling of dam; Reshape surface; Rip and seed if the area is identified for revegetation											
		Water Supply Tanks	Remove tanks; Break up concrete bases; Reshape surface; Rip and seed if the area is identified for revegetation											
		Seepage Recovery and Water Supply Bores	Retain during post closure period for seepage recovery; and Once no longer required, decommission as per DoW guidelines.											
		Monitoring Bores and associated pipelines	Above ground pipelines: flush and remove and sell or recycle											

9.7.2 Mt Charlotte Operational Area

9.7.2.1 Mt Charlotte Planned Closure Tasks & Studies - Schedule

Table 9-81: Closure Tasks – Mt Charlotte Operational area

Operational Area	Domain	Feature	Task	Current Status (2018)	2015 MCP	2018 MCP	2021 MCP	2024 MCP	2027 MCP	2030 MCP	2033 MCP	2036 MCP	2036 - 2039	Post closure
These timelines are based on the KCGM BP 2021 LOM Plan														
Mt Charlotte	Mining Infrastructure	Glory Hole Pit	Develop Open Pit Abandonment Strategy	3rd party review undertaken; initial planning commenced; this work will take longer than expected - timeline extended								2034: End of LOM		
			Pit wall stability monitoring	Geotechnical inspections completed										
			Shaft seal designs											
			Final Shaft Sealing Report											

9.7.2.2 Mt Charlotte Planned Rehabiltation Activites - Schedule

Table 9-82: Rehabilitation Activities – Mt Charlotte Operational area

Operational Area	Domain	Feature	Task	Current Status (2018)	2015 MCP	2018 MCP	2021 MCP	2024 MCP	2027 MCP	2030 MCP	2033 MCP	2036 MCP	2036 - 2039	Post closure
These timelines are based on the KCGM BP 2021 LOM Plan														
Mt Charlotte	Mining Infrastructure	Glory Hole Pit	Develop Open Pit Abandonment Strategy	3rd party review undertaken; initial planning commenced; this work will take longer than expected - timeline extended								2034: End of LOM		
			Pit wall stability monitoring	Geotechnical inspections completed										
			Shaft seal designs											
			Final Shaft Sealing Report											

9.7.3 Gidji Operational Area MS:1032

9.7.3.1 Gidji Planned Closure Tasks & Studies - Schedule

Table 9-83: Closure Tasks – Gidji Operational Area

Operational Area	Domain	Feature	Task	Current Status (2018)	2015 MCP	2018 MCP	2021 MCP	2024 MCP	2027 MCP	2030 MCP	2033 MCP	2036 MCP	2036 - 2039	Post closure
These timelines are based on the KCGM BP 2021 LOM Plan														
Gidji	Tailings Storage Facility	Gidji TSF	Soil characterisation & erosion modelling									2034: End of LOM Gidji processing		
			TSF closure design											
			Further field studies and analysis of water balance for Gidji II & III closure design											
			Refine TSF closure design											
			Update Gidji groundwater model											
			TSF Decommissioning Plan											
			Final TSF Report											

9.7.3.2 Gidji Planned Rehabiltation Activites - Schedule

Table 9-84: Rehabilitation Activities – Gidji Operational Area

Operational Area	Domain	Feature	Approach	Current Status (2018)	2015 - 2018	2018 - 2021	2021 - 2024	2024 - 2027	2027 - 2030	2030 - 2033	2033 - 2036	2036 - 2039	2039- 2042	Post closure
These timelines are based on the KCGM BP2021 LOM Plan														
Gidji MS 1032	Mineral Processing Infrastructure	Processing Plant (including roaster and access road)	Run down reagent inventory and hydrocarbons prior to closure date								2034: End of LOM Gidji processing			
			Salvage remaining gold from applicable plant											
			Remove buildings and other infrastructure											
			Investigate potential contamination											
			Cyanide decontamination of plant and equipment											
			Decontaminate and make safe prior to demolition											
			Dismantle/demolish all structures; Break up concrete and metal											
			Break up scrap metal and recycle where possible											
			Break up hard stand areas											
			Break up scrap metal and recycle where possible;											
			Reshape surface and sheet with rehabilitation materials where required and if available;											
			Reshape surface; Rip and seed if the area is identified for revegetation											
Gidji	Tailings Storage Facility	Gidji I TSF Gidji II TSF	Remove piping and other infrastructure such as decant pumps											
			Allow sufficient drying time (est. 2-3 yrs)											
			Profile outer embankments											
			Cover outer slopes and surfaces with appropriate waste rock											
			Upper surface of TSF reshaped for water control and capped											
			Implement water shedding design											
			Rip and seed if the area is identified for revegetation											
			Maintain fencing to restrict access											
			Continue dewatering until active management is no longer required											
			Backfill all seepage trenches and ponds											

9.7.4 Mt Percy and Regional Operational Area

9.7.4.1 Mt Percy & Regional Closure Tasks & Studies - Schedule

Table 9-85: Closure Tasks – Mt Percy and Regional Operational Areas

Operational Area	Domain	Feature	Task	Current Status (2018)	2015 MCP	2018 MCP	2021 MCP	2024 MCP	2027 MCP	2030 MCP	2033 MCP	2036 MCP	2036 - 2039	Post closure
These timelines are based on the KCGM BP 2021 LOM Plan														
Mt Percy	Mining Infrastructure	Sir John Open Pit Mystery and Union Club Open Pits	Develop Open Pit Abandonment Strategy	Implement abandonment structures										
			Final Geotechnical Report											
			Pit wall stability monitoring	Geotechnical inspections completed										

Operational Area	Domain	Feature	Task	Current Status (2018)	2015 MCP	2018 MCP	2021 MCP	2024 MCP	2027 MCP	2030 MCP	2033 MCP	2036 MCP	2036 - 2039	Post closure
These timelines are based on the KCGM BP 2021 LOM Plan														
Regional			Develop final remedial option for Mullingar TSF											
			Develop final remedial option for Morrison Flats area											

9.7.4.2 Mt Percy & Regional Planned Rehabiltation Activites - Schedule

Table 9-86: Rehabilitation Activities – Mt Percy and Regional Operational Areas

Operational Area	Domain	Feature	Approach	Current Status (2018)	2015 - 2018	2018 - 2021	2021 - 2024	2024 - 2027	2027 - 2030	2030 - 2033	2033 - 2036	2036 - 2039	2039- 2042	Post closure
These timelines are based on the KCGM BP2021 LOM Plan														
Mt Percy	Mining Infrastructure	Sir John Open Pit	Implement risk-based approach to prevention of inadvertent access in open pit areas								2034: End of LOM Gidji processing			
			Complete backfill											
		Mystery and Union Club Open Pits	Implement risk-based approach to prevention of inadvertent access in open pit areas											
		Ore Stockpiles and ROM Pads Laydowns Plant Site	Site verification inspection of completed rehabilitation works.											
	Waste Rock Dumps	Sir John WRD	Site verification inspection of completed rehabilitation works.											
		Union Club WRD												
		Mystery WRD												
	Tailings Storage Facility	Mt Percy TSF	Construction of robust crest bunds;											
			Maintain fencing to restrict access											
			Site verification inspection of completed rehabilitation works											
	Roads and other remaining infrastructure		Remove windrows and reinstate natural drainage Rip and seed											
Regional	Historical, Inactive Tailings Storage Facilities	Mullingar TSF	Implement planned work											
		Morrisons Flats Tailings Area	Implement planned work											
	Exploration	Drill Holes and Sumps	Rehabilitated during operations											
		Tracks and Gridlines	Rehabilitated during operations											
	Groundwater Infrastructure	Regional Production Borefields (including bores, pipelines and bunds)	Decommission bores; Flush pipelines; Reinstate area along corridor											
	Contaminated Sites		Implement planned work											

10. CLOSURE MONITORING AND MAINTENANCE

Following closure there will be a period of monitoring to demonstrate successful achievement of closure outcomes and criteria, i.e. to ensure public safety and demonstrate to the regulatory bodies and the community that the operation is approaching a safe and sustainable state and that there are no persistent adverse impacts. For KCGM, the post closure monitoring period has been nominated as ten years. The monitoring frequency and responsible persons for each outcome and associated closure criteria are provided in Table 10-1.

The following sections provide detail on the proposed monitoring programs for each of the closure aspects and outcomes. It should be noted that many of the monitoring programmes will be scaled down versions of the existing monitoring networks e.g. over time seepage bores will become dry and the number of bores will reduce accordingly.

The results of post closure monitoring will be submitted to the DMIRS and DWER in annual reports or ongoing versions of the MCP. If monitoring indicates closure criteria are not being met, or are not likely to be met, monitoring and annual reporting will continue and an appropriate investigation will be undertaken to determine whether the criteria were not appropriate or if alternative strategies should be considered.

Table 10-1: Closure Monitoring and Measurement Methods and Frequencies

CLOSURE OUTCOME	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT	FREQUENCY	RESPONSIBLE PERSONS
SAFETY					
Inadvertent access is restricted as much as practicable to any landforms or structures that are considered unsafe.	Buildings and Infrastructure	The footings /foundations/anchors of all mine structures/ buildings/services to be buried at least 0.5 m below the final land surface.	Compliance certification (photographic and survey data) provided by demolition contractor for submission in Final Mine Relinquishment Report.	One off at time of demolition	Mine Closure Coordinator to receive and submit certification within Final Mine Relinquishment Report.
	Transferred assets	The post closure retention of any mine infrastructure requires agreement from relevant Stakeholders and legal documentation of ownership transfer.	Transfer of ownership legal documentation included in Final Relinquishment Report.	One off at time of infrastructure handover.	Mine Closure Coordinator to receive and submit documentation within Final Mine Relinquishment Report.
	Mine waste landforms/ excavations	Crest / safety bunds constructed on any remaining excavation/ trench/channel/pit/embankment/ landform with slopes exceeding 25 degrees or depth exceeding 0.5 m.	Confirmation of construction of safety measures through visual inspection and/or aerial images.	One off after post closure implementation and signoff inspection to be completed at the completion of closure works.	Inspections to be carried out by Mine Closure Implementation Team. Mine Closure Coordinator to receive and collate inspection records for inclusion in Final Relinquishment Report.
	Open Pits (Fimiston, Mt Percy, Mt Charlotte)	Pit abandonment bunding complies with Mines Safety and Inspection Regulations 1995 and DMIRS 1997 Guidelines (DOIR 1997) requirements.	Abandonment / safety bund completion recorded in MCP or associated close out documents – assessment via aerial photography / DTM or site inspection by suitable professional.	One off report prepared at time of relinquishment.	Geotechnical engineer, surveyor or other suitable person. Mine Closure Coordinator to receive and collate report for inclusion in Final Relinquishment Report.
	Open Pits (Fimiston, Mt Percy, Mt Charlotte)	Geotechnically high risk unstable areas/mine structures/zones are captured within abandonment bunding/ safety bunds.	Completion of final assessment at end of mining operations recorded in MCP or associated closeout report. Submission of Final Relinquishment Report to DMIRS geotechnical engineers.	Abandonment bund positioning assessed during approvals and closure planning process. Geotechnical monitoring of Fimiston pit walls for 5 years post closure. Mt Charlotte	Geotechnical engineer. Mine Closure Coordinator to receive and collate report for inclusion in Final Relinquishment Report.

CLOSURE OUTCOME	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT	FREQUENCY	RESPONSIBLE PERSONS
				and Mt Percy frequency as per geotechnical advice. One off report for final assessment prepared at time of relinquishment.	
	Mine waste landforms	Any (older) mine waste landforms located or partially located within long term mine pit instability zone to have competent abandonment bund/s designed and implemented based on area specific assessment to restrict vehicle access to safe area of landform.	Certification of compliance based on aerial photography / DTM and site inspection by suitable professional recorded in Final Relinquishment Report.	One off report prepared at time of relinquishment.	Geotechnical engineer, surveyor or other suitable person. Mine Closure Coordinator to receive and collate report for inclusion in Final Relinquishment Report.
	Major Underground openings	Mt Charlotte portals and vent shaft openings to underground mine workings to have an engineered permanent seal.	As-constructed engineering drawing or photographic evidence of sealing of all U/G opening seals. Completion of implementation recorded in Final Relinquishment Report, provided to Mine Safety Inspector.	One off report prepared at time of relinquishment.	UG Statutory person (legal requirement for them to supervise activities) to provide drawings/photographs. Mine Closure Coordinator to receive and collate for inclusion in Final Relinquishment Report.
	Underground voids at Mt Charlotte	Major underground voids assessed to have long term geotechnical risk to be backfilled.	Final geotechnical risk and backfill assessment completion report by suitably qualified professional provided in Final Relinquishment Report.	Geotechnical risk assessment and backfilling completed progressively during operations. One off assessment and report prepared at time of completion and relinquishment.	UG Statutory person (legal requirement for them to supervise activities) to provide drawings/photographs. Mine Closure Coordinator to receive and collate for inclusion in Final Relinquishment Report.
	Fimiston mine waste landforms	All mine waste landforms and remaining structures to be compliant with Kalgoorlie-Boulder Airport height restrictions or other CASA requirements.	Confirmation through as-constructed DTMs of height of mine waste landforms.	Compliance with height restrictions monitored during mine planning and construction (6 monthly internal audits).	Open Pit Mining Planning/Mining Superintendent to provide confirmation of compliance with height restriction.

CLOSURE OUTCOME	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT	FREQUENCY	RESPONSIBLE PERSONS
				One off closure report prepared at time of relinquishment.	Mine Closure Coordinator to receive and collate for inclusion in Final Relinquishment Report.
	Fimiston and Mt Percy Open Pits	Retain pit access ramp for geotechnical monitoring during post closure monitoring and emergency access to pit lakes, with reasonable danger/hazard warning signage.	Photographic evidence provided in MCP or associated close out documents.	One off closure report prepared at time of relinquishment.	Mine Closure Coordinator to take photographs and collate for Final Relinquishment Report.
Site closure activities are completed in a manner which ensures the safety and health of workers.	All operations	Current WA mine industry OHS standards.	KCGM safety systems and procedures implemented for any closure related physical works/activities in compliance with Mines Safety Act.	Ongoing monitoring and assessment of safety performance undertaken during operations to continue during the closure period.	Assessment of safety performance during closure period to be collated by Safety Advisor and provided to Mine Closure Coordinator for inclusion in Final Relinquishment Report.
GEOPHYSICAL STABILITY					
Mine landforms achieve long term geotechnical stability.	**Mine waste landforms**	Mine waste rock dumps and TSFs have slopes of <25 degrees (excluding buttressed areas).	Assessment at end of operations to ensure slopes are battered down and stable through site inspections or DTMs, recorded in MCP or associated closeout report.	As built reconciliation with design and geotechnical monitoring completed during mine planning and construction. One off closure report prepared at time of relinquishment.	Mine Planner, surveyor or suitable person to complete assessment report. Mine Closure Coordinator to receive and collate report for inclusion in Final Relinquishment Report.
	TSFs	TSF FoS > 1.5 at completion of closure monitoring and downward trending phreatic surface (ANCOLD 2019 or approved alternative).	TSF embankment stability assessment as per ANCOLD 2019 Guidelines, verified by suitably qualified engineer.	Annual audits of TSF construction and/or operation completed during operations. One off closure report prepared at time of relinquishment.	TSF Engineer / Engineer on Record to provide geotechnical assessment of closed and drained down TSFs. Mine Closure Coordinator to receive and collate report for inclusion in Final Relinquishment Report.
Open Pit wall geotechnical	Fimiston and Mt Percy Open Pits	Open Pit wall movement not to exceed rates which could	Geotechnical post closure monitoring methods as	Geotechnical monitoring program for 5 years after mining of Fimiston Open Pit.	TSF Engineer or other suitable person to conduct monitoring

CLOSURE OUTCOME	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT	FREQUENCY	RESPONSIBLE PERSONS
stability will be managed		compromise the calculated zone of instability.	recommended by qualified Geotechnical Engineer. Final geotechnical zone of instability assessment report by qualified Geotechnical Engineer after post mining monitoring period, with recommendations actioned. Submission of close out report to DMIRS geotechnical engineers.	Mt Charlotte and Mt Percy Pit frequency as recommended by geotechnical professional.	and prepare final zone of instability report. Mine Closure Coordinator to receive and collate report for inclusion in Final Relinquishment Report.
Long term erosion stability and integrity of engineered mine landform covers based geomorphological processes observed within the local region.	**TSFs** **WRDs**	Appropriately implemented surface water management structures on TSFs as per ANCOLD 2019 Guidelines. Rehabilitation implementation meets design intent with appropriately implemented surface water management structures on WRDs i.e. erosion resistant design has water catchment on benches and water retaining design slope cover.	Design and implementation verified by suitably qualified engineer and recorded in MCP or associated close out documents.	Reconciliation to design of as built and rehabilitated landforms completed during mine planning and mining operations. One off closure report prepared at time of relinquishment.	Open Pit Mining Planning/Mining Superintendent to provide confirmation of compliance with design. Mine Closure Coordinator to receive and collate for inclusion in Final Relinquishment Report.
	TSFs WRDs	Rates of erosion of landform covers are within an acceptable range taking into account regional climatic conditions and material characteristics and do not impact on the geotechnical integrity of the landform. No visual evidence of active gully erosion exposing underlying dispersive and/or unstable material.	Site inspection report and whole of landform aerial photographic analysis by suitably qualified professional.	One off closure report prepared at time of relinquishment.	Whole of landform erosion assessment completed by suitably qualified person. Mine Closure Coordinator to collate for Final Relinquishment Report.
	Mine waste landforms, especially TSFs	Where required and practicable, access to rehabilitated landforms is to be limited through the use of fences or rock bunds.	Site inspection records (including photographs and GIS mapping) to verify installation of fences to limit access recorded	One off closure report prepared at time of relinquishment.	Mine Closure Coordinator to complete monitoring and collate for Final Relinquishment Report.

CLOSURE OUTCOME	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT	FREQUENCY	RESPONSIBLE PERSONS
		Perimeter fencing in place around all TSFs and access to Gidji TSFs restricted.	in MCP or associated close out documents.		
NON-POLLUTING					
The landforms containing materials of concern will be managed to minimise impacts to the quality of the surrounding environment.	Ore stockpile – Black Flag shale Gidji TSF	High Grade Black Flag stored within dedicated stockpile area with encapsulation closure design. Gidji TSF closure design is appropriate for AMD material	Record of high grade BF ore stockpile capping design and implementation in MCP or associated close out documents. Record of Gidji design implementation in MCP or associated close out documents.	Reconciliation to design of as built and rehabilitated landforms completed during mine planning and mining operations. One off closure report prepared at time of relinquishment.	Open Pit Mining Planning/Mining Superintendent to provide confirmation of compliance with design. Mine Closure Coordinator to receive and collate for inclusion in Final Relinquishment Report.
	Mine waste landforms (WRDs TSFs)	Mine waste landforms do not actively discharge alluvial fans into adjacent natural drainage lines (creeks). No discharge of sediment or contaminants of concern beyond the assimilative capacity of the local environment based on Australian Standards.	Aerial photography verification of no active alluvial fans extending beyond the immediate footprint of mine waste landforms. Action if identified. Relevant post closure groundwater and surface runoff monitoring data.	Photographic monitoring of alluvial fans annually during post closure period for 5 years. Water monitoring conducted annually during post closure period for 5 years.	Mine Closure Coordinator to complete monitoring and collate results for inclusion in Final Relinquishment Report.
	TSFs	No discharge of seepage waters that impacts on beneficial use of groundwater. Groundwater levels remain below or at depth targets.	Groundwater level monitoring of appropriately scaled monitoring network, until proposed groundwater depth targets are achieved. Final groundwater closeout report by suitably qualified professional.	Water monitoring conducted annually during post closure period for 5 years.	Mine Closure Coordinator to coordinate monitoring and provide to a suitably qualified professional for analysis. Mine Closure Coordinator to include summary report within Final Relinquishment Report.
	Mineral Processing areas – Fimiston and Gidji Mining Maintenance – Fimiston	All reagents and chemicals removed from site with any residual site contamination investigated and actioned as per the Contaminated Sites Act 2003.	As required, monitoring in accordance with Contaminated Sites requirements.	Monitoring frequencies as required and recommended by Contaminated Sites professional assessment.	Suitably qualified Contaminated Sites professional to completed assessment.

CLOSURE OUTCOME	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT	FREQUENCY	RESPONSIBLE PERSONS
					Mine Closure Coordinator to include summary report within Final Relinquishment Report.
SUSTAINABLE LAND USE					
Rehabilitate disturbed areas to a modified landscape receptive to vegetation regrowth and recovery over time considering visual amenity and properties of available rehabilitation materials.	Fimiston	Fimiston operational area revegetation has values indicative of the agreed post mining land use, modified landscape, accounting for placement of rehabilitation material types (implementation of the Visual Amenity Strategy).	Rehabilitation performance monitoring using accepted vegetation monitoring techniques and measures. Includes assessment against targets values, and demonstration of the ability to become self-sustaining.	Full quantitative and qualitative assessment completed initially when rehabilitation has been completed with annual qualitative photographic monitoring completed thereafter.	Vegetation monitoring to be conducted by suitably qualified professional. Report to be included in the Final Relinquishment report by the Mine Closure Coordinator
	Mt Percy Mt Charlotte	Mt Percy and Mt Charlotte operational area revegetation has values indicative of the agreed post mining land use, modified landscape, accounting for limitations of the available materials used in rehabilitation.			
	Gidji	Gidji operational area has values indicative of the planned target post mining land use of modified landscape, accounting for limitations of the largely sodic soils available for rehabilitation.			
	All areas	Management of Declared Weeds or Weeds of National Significance on landforms.	Rehabilitation performance monitoring includes identification of Declared and National Significance weeds.		
LEGAL COMPLIANCE					
Maintain compliance with all legal and other requirements during the closure planning	All areas	Maintain closure legal commitment register with triannual review and update.	Reviewed and updated Legal Register provided in 3 yearly MCP. Legal compliance audit in final relinquishment report/MCP.	Legal compliance audit conducted prior to submission of final MCP. Update of legal compliance register during 3 yearly updates of MCP.	Updates to legal compliance register completed by Mine Closure Coordinator. Legal Compliance Audit completed by suitably qualified professional.

CLOSURE OUTCOME	FEATURE	CLOSURE COMPLETION CRITERIA	MEASUREMENT	FREQUENCY	RESPONSIBLE PERSONS
and implementation process.					Mine Closure Coordinator to include summary report within Final Relinquishment Report.
CLOSURE PLANNING					
Cost effective and timely closure planning and implementation	All Areas	Rehabilitation deemed appropriate as per 3rd party review and regulatory sign off of MCP.	Regulatory approval of triennial MCP. 3rd Party review of rehabilitation methods may be recorded in Final Relinquishment Report.	3rd Party review conducted prior to submission of final MCP.	Mine Closure Coordinator to include summary report within Final Relinquishment Report.
	All Areas	Implementation of progressive rehabilitation within the constraints of mine development reported annually in AER and triennially in MCP.	Record of proposed and completed progressive rehabilitation in the MCP and AERs.	Triennually as part of the MCP. Annually as part of the AER.	Mine Closure Coordinator to include summary report within Final Relinquishment Report.
STAKEHOLDER CONSULTATION					
KCGM's key stakeholders will be consulted in relation to post closure outcomes.	All Areas	Submission of triennial MCP, which considers feedback from Key Regulatory stakeholders.	Approval of MCP.	Triennually as part of the MCP.	Community Relations Superintendent to provide feedback received from stakeholders. Mine Closure Coordinator to collate and include in MCP.
Community stakeholder representatives will be engaged in relation to post closure outcomes.	All Areas	Where appropriate, community consultation and outcomes reported in MCP.	Record of consultation and outcomes included in MCP.		

10.1 Health, Safety, and Security

10.1.1 Restriction of Inadvertent Access

Any incidences of inadvertent access to the mine during the post closure period will be recorded, investigated and actioned using the existing incident reporting system.

10.1.1.1 Open Pits and Mine Landforms

The infrastructure constructed during closure implementation to restrict inadvertent public access post closure (i.e. abandonment bunding around pits and landforms within the zone of instability, fences and rock bunds) will be inspected, monitored and maintained during operations (if constructed as part of progressive rehabilitation) or for a period of time post closure (nominally 10 years if constructed at end of mine life) to ensure integrity. A once off site inspection records (including photographs and GIS mapping) to verify installation and that they are fit for purpose. During post closure monitoring period, geotechnical personnel may require access to pit monitoring locations, requiring restricted access to the pits and landforms. Post closure emergency access will be allowed for monitoring Photographic or other evidence of abandonment will be provided in MCP or associated close out documents. Any geotechnical or engineering assessment to ensure public safety will be completed by suitably qualified professionals.

Compliance of mine landforms with the Kalgoorlie Boulder Airport height restrictions is monitored and managed during mine planning and construction. At closure, a one off closure report will be prepared by the Open Pit Mining Planning/Mining Superintendent (or suitable equivalent) confirming the as-built surveyed position of landforms below the height restriction. Monitoring outcomes will be recorded in the final MCP or associated closeout report and provided to Mine Safety Inspector.

Historic Voids

Throughout KCGM's tenure, and other land holder's tenure, historic voids (shafts, audits, stopes and other mining features) occur. These historic features often represent a safety hazard. When they occur on KCGM tenure and are considered a risk, they are assessed and remediated as per KCGM's voids department recommendations. This work is ongoing (often with a higher occurrence after good rainfall). KCGM will remediate these features as part of closure works and will not see Program of Work or Mining Proposal approvals prior to implementing safety works as this is considered a safety initiative.

Other non-mining tenure holders are responsible for voids on their property, and many, such as the Shire, have existing systems to deal with the historic voids.

10.1.1.2 Underground

Major underground openings sealing will be monitored via site inspections, including provision of photographic evidence that sealing has been conducted as per engineered design. A Final Shaft Sealing Report will confirm that designs were implemented to specifications and requirements of *Mine Health Safety Act 1994*.

During operations, existing and historic underground voids of geotechnical significance are monitored by an existing geotechnical team. The voids receive backfill material from Fimiston via the conveyor belt and Mt Charlotte Open Pit as well as from active underground mining waste and the percentage fill is monitored. As some of the voids are interconnected, there are a few identified portions of voids that can only be filled at the end of operations when no further drawdown occurs. Post closure, an assessment of the underground voids for geotechnical risk and unravelling will be completed by a geotechnical engineer. Record of underground voids requiring backfill and their backfill status will be assessed and recorded as part of the annual internal review (ongoing), within annual reports showing implementation status (% fill). A final backfill assessment completion report by a suitably qualified professional will be included within the Final Relinquishment Report.

10.1.1.3 Buildings, Infrastructure and Transferred Assets

Where infrastructure has been demolished and removed, post demolition inspections will be conducted by the Mine closure Coordinator or project engineer to ensure adequate completion. These inspections will be included in a report to be recorded in the MCP or associated closeout report.

Leading up to the closure period, formal negotiations with interested parties for the transfer of ownership of KCGM assets will be initiated and managed within reasonable timeframes (nominally 2 years) by the Contracts

Department. Monitoring of this deadline will be completed during ongoing management of the signoff process and reported.

10.1.2 Safety and Health of Workers

Existing processes and systems in place during operations for management of safety will continue to be used to ensure a safe working environment for the closure team. This will include routine assessments of safety performance, as well as internal and external reporting as required.

10.2 Geophysical Stability

10.2.1 Mine Landforms Geotechnical Stability

KCGM has systems in place for design and construction of WRDs, which include geotechnical assessment of proposed designs, and geotechnical inspections of operational WRDs. Rehabilitation push down of WRDs to current rehabilitation design angles ensures geotechnical stability of the slopes; an assessment of WRDs will be conducted at end of operations to ensure slopes are battered down and stable through site inspections or DTMs, recorded in MCP or associated closeout report.

Monitoring of the TSFs will include assessment of the drain down of the phreatic surface, with a view to confirming that long-term drained conditions prevail and hence a suitable factor of safety against slope instability exists. TSFs will be assessed against the ANCOLD Guidelines for stability current at the time of closure by a suitably qualified TSF engineer. Assessment outcomes will be provided for inclusion within regular reporting to regulators and within the Final Relinquishment Report.

10.2.2 Open Pit Wall Geotechnical Stability

Monitoring of geotechnical stability and/or seismic activity will be undertaken at several locations in the KCGM Operations in the post closure period, provided safe access is possible, including:

- Monitoring of pit wall stability at the Fimiston Open Pit;
- Monitoring of pit ground stability and seismic activity at Mt Charlotte; and
- Monitoring of pit wall stability at Glory Hole Open Pit (Mt Charlotte).

10.2.2.1 Fimiston Open Pit

Post closure pit wall stability monitoring at the Fimiston Open Pit will primarily consist of:

- Visual inspections; and
- Monitoring of movement of the ex-pit area between the pit crest and City of Kalgoorlie-Boulder via a survey pillar network.

It should be noted that there have been significant changes in monitoring technology, both in terms of techniques available and cost reductions in some pre-existing techniques in the last 15 to 20 years of KCGM operations. It is considered extremely likely that any post-closure monitoring technique proposed in this iteration of the MCP will have been rendered obsolete by the time of mine closure in 2035. The closure monitoring strategy that will be submitted as part of the ongoing mine closure planning process will therefore be explicitly a pro-term solution only, and its continuing suitability will be re-assessed on a regular basis, in particular at the end of LOM. Based on currently available technologies, the monitoring strategy for pit wall movement post-closure that is proposed in the first instance is as follows:

- Within the pit, the network of prisms installed on the pit walls will be retained, as will the network of survey pillars both within the pit and on the pit rim. As access to the pit rim and the interior of the pit will be maintained for the purposes of pit lake monitoring / emergencies, this will enable survey measurements for be made at a regular frequency (nominally quarterly) for the purposes of monitoring post-closure wall movements.
- Monitoring of the ground surface outside the pit abandonment bund will be accomplished by using INSAR monitoring. Spatial data are available either free of charge, or for relatively low cost, and the services of a consultant will be required for around 5 days per year to process data on a bi-annual basis to assess any movements. This will remove the need for any physical installations between the abandonment bund and town.

- Visual inspections on a quarterly basis. The inspection will consist of identifying zones of cracking or slumping by; a walk over inspection of the pit crest, noise bund and pit margins; inspection of major catch berms; and inspection of exposed geological structures.

The ongoing monitoring frequency will be reviewed in consultation with the DMIRS based on the observed performance of the pit walls. Visual inspections will be undertaken until observations from inspections in combination with other monitoring data indicate they are no longer required.

Should movement of the pit wall during the post closure period indicate that the calculated zone of instability will be compromised, review and recalculation will be conducted by a geotechnical engineer, allowing for the properties of geological rock masses and erosion. Implementation of abandonment bunding will be adjusted to a practical location.

A Final geotechnical zone of instability assessment report will be compiled by qualified Geotechnical Engineer after post mining monitoring period, with any recommendations actioned. This report will then be submitted to DMIRS geotechnical engineers as part of the final relinquishment report.

10.2.2.2 Mt Percy Open Pit

Similar quarterly inspections of Mt Percy pits will continue. A final assessment will be made by a geotechnical engineer once abandonment structures and buttresses are in place, as part of the final relinquishment report.

10.2.2.3 Ground Stability and Seismic Activity at Mt Charlotte

Monitoring of ground stability and seismic activity will continue after completion of mining at Mt Charlotte to assess the conditions of subsidence and seismicity. The existing monitoring sites will be used to continue monitoring at Mt Charlotte Underground Mine, dependent on post closure accessibility. The requirement for ongoing monitoring will be assessed upon the completion of backfilling of the Glory Hole Pit and underground workings at Mt Charlotte.

10.2.3 Long Term Erosion Stability and Integrity of Engineered Mine Landforms

10.2.3.1 Appropriate Surface Water Management

Once rehabilitated, constructed landforms will discharge surface water to the surrounding environment. Any water management features, for example rock drains or sediment retention features which are part of the closure design, will be inspected to ensure they have been constructed to specifications.

10.2.3.2 Erosion Within Acceptable Ranges

Erosion studies have been undertaken to identify the optimal designs for landform stability for Fimiston Operational Area. These studies were used to develop the erosion resistant design which is currently implemented. Trials or initial implementation areas for the erosion resistant design are used as field observation opportunities, with improvements made to design or design implementation if any learnings are identified.

A significant body of work to understand soils and erosion at KCGM was undertaken between 2009 and 2015. This data was used to formulate new designs with acceptable erosion rates. Work has also been conducted on materials at Mt Percy and Gidji operational areas.

KCGM is moving to a more holistic view of monitoring. Monitoring commences with the quality assurance of rehabilitation activities against planned design. Due to the high salinity of the rehabilitation materials, further work is being conducted on:

- Salinity, and the linkage between salinity and revegetation success. Early findings show a direct correlation between salinity and plant density;
- Erosion observations and rock percentage in rehabilitated areas; and
- Vegetation monitoring (see Section 10.3.6), in a format that has better alignment with the completion criteria and at frequencies that are appropriate for the rainfall/vegetation patterns of the Goldfields.

Erosion monitoring will likely be a combination of field inspections with analysis of aerial photography by suitably qualified personnel and will include observations of whether erosion has exposed any unfavourable materials (highly erodable or geotechnically unstable) which could compromise the integrity of the landform, including the presence/absence of large or active gullies (i.e. gullies deeper than 1 m through capping layer).

The intensity of monitoring methods, spatial distribution and frequency of monitoring will adapt to the ongoing rehabilitation monitoring results. Rehabilitation monitoring techniques are undergoing rapid change,and are likely to change substantially prior to closure of KCGM.

10.3 Non-Polluting

10.3.1 Acid Mine Drainage

10.3.1.1 Ore Stockpile – Black Flag Shale

Black Flag material from the pit is managed during operations by high grade Black Flag ore being tipped in a specific stockpile location, with an encapsulation design planned post closure. Reconciliation to design of tipping locations of Black Flag is conducted during operations, and post closure, inspections and design reports will confirm the encapsulation of the high grade stockpile.

Waste black flag material is co-mingled with large volumes of NAF waste rock (which has buffer capacity) or burial below significant depths of oxide material. There are also tip head controls placed on minimum distance from out edge or top of WRDs for Black Flag waste material. This is a conservative approach and must be implemented during operations to achieve closure outcomes. Mine Planning provides Mining Supervisors with this information in the monthly waste dump plan. In addition, the WENCO fleet control system designates which waste may be tipped at each tip head destination.

10.3.1.2 Gidji TSF

The Gidji II and III TSFs have been determined to contain PAF material which will be encapsulated post closure to mitigate the generation of AMD. Monitoring will be typical construction design reporting of design to as built.

10.3.2 Appropriate Surface Water Management

Inappropriate water management on mine waste landforms surfaces will lead to erosion and the transport of sediments into the wider environment via alluvial fans. Measurement of the extent and activity of alluvial fans from the toe of WRDs and TSFs will be conducted via aerial photography with appropriate management actions to be completed if identified.

10.3.3 Management of Seepage from Fimiston TSFs

10.3.3.1 Groundwater Levels

During the KCGM operational period, the Fimiston TSFs are operated and monitored under DWER licences (L6420/1988/14) which set targets and linked management actions for groundwater depths within mandated Seepage and Groundwater Management Plans (SGMPs).

During the post closure period a Closure version of the SGMPs will be implemented. Draft groundwater target water levels and key monitoring bores have been identified, and are provided in Appendix 5.7, the Closure SGMPs are expected to operate at reducing pumping rates for 10 years post deposition.

Protection of the environmental values associated with groundwater at the Fimiston TSFs requires that naturally saline groundwater remains below the potential vegetation root zone. It is therefore proposed that closure criteria values be set for groundwater depths at individual bores as follows:

- Values will be defined as groundwater depth below surface, not as groundwater elevations, as depth is the controlling parameter for potential impacts to vegetation.
- Values will be set for the compliance bores defined in the operational licence, for ease of transitioning between operations and closure. The existing compliance locations have been demonstrated to be suitably located to be protective of vegetation during the operating period.
- The Fimiston II E TSF is not currently included in the operational licence. Construction will require decommissioning of existing compliance bores and commissioning of new compliance bores, which are not currently on the licence. For the purposes of developing draft criteria values, these are assumed to be the compliance bores in the licence. This assumption will need to be revisited once the license has been reissued.

- Depth criteria values will be set individually for each compliance bore, and be calculated as the depth which would be protective of vegetation in that location, plus an allowance for rebound associated with ongoing residual seepage from the TSFs, plus an allowance for the maximum likely temporary rise in groundwater levels associated with natural recharge from unusually large precipitation events.
- If the resulting depth criteria value at a bore is comparable to the estimated pre-mining groundwater depth in that location (where available), the bore should continue to be monitored, but should be switched from compliance to interpretation status, and groundwater depth should be subject to ongoing review. The objective of this action is to avoid setting a value which is below the naturally occurring depth, which would potentially require artificial manipulation of groundwater depths (active pumping) in perpetuity.

Closure criteria values for depths are around 5.5 m in most locations (specific closure criteria values for each bore are provided in Appendix 5-11). The target depths reduce to around 1 m in Zone B at the Kaltails TSF, where only shallow rooted vegetation is present due to the naturally occurring shallow groundwater depths, and increase to a maximum of 9.6 m near Fimiston I and II, where a larger allowance is required for recharge events.

Taking account of the natural variation in groundwater depths, and of the time period over which seepage pulses travel through the groundwater system, the management actions linked to the defined groundwater depth criteria would potentially be:

- Once all compliance bores in an area have been below their criteria values for 6 months, pumping bores upgradient of that area will be switched off, but not decommissioned.
- Ongoing monitoring will be undertaken. If the observed rebound is higher than was assumed in the calculation of the closure criteria values, it may be necessary to recommence pumping temporarily.
- Once all compliance bores in that area have been below their criteria values for 12 months, the pumping bores will be decommissioned.

10.3.3.2 Groundwater Chemistry

Seepage influences on groundwater hydrochemistry clearly do not impact on the potential beneficial use for mineral processing, as demonstrated during the KCGM operating period when seepage recovery has been a significant proportion of process water use. The natural salinity of the groundwater makes it toxic to vegetation, regardless of the other hydrochemical constituents. Therefore, no closure criteria for groundwater hydrochemistry near the mine facilities are proposed for the protection of non phreatophytic vegetation. This is consistent with the compliance aspects of the operational Prescribed Premises Licence which includes targets and triggered actions for groundwater depths but not for groundwater hydrochemistry.

However, it is possible that monitoring of groundwater quality upgradient of potential discharge zones may be required to confirm that the environment at Hannan Lake is being protected in long term closure. Potential monitoring locations for groundwater hydrochemistry would then be:

- downgradient of and outside the existing influences of the TSFs;
- upgradient of the potential influence of the Golden Mile Milling TSF;
- close to the KCGM boundary where groundwater flows into the receiving environment at Morrisons Flats.

Therefore, potential monitoring locations could include bores in the Trafalgar Borefield and Kaltails TSF Borefield monitoring bore MB K67 which is downgradient of the Kaltails TSF and upgradient of potential groundwater discharge zones.

It should be noted that given the naturally saline hydrochemistry of groundwater in these locations, and the background variation in TDS concentrations and pH which have been observed during KCGM monitoring, closure criteria would need to be based around detecting any changes in hydrochemistry which are a statistically significant departure from the background conditions.

10.3.4 Management of Seepage at Gidji TSFs

During the operational period, the Gidji TSFs are operated and monitored under a DWER licence (L5946/1988/13) which sets targets and linked management actions for groundwater depths within mandated Seepage and Groundwater Management Plans (SGMPs).

The Gidji Seepage and Groundwater Management Plan is likely to be discontinued during the operating period, after operational targets are met for groundwater conditions around the decommissioned, unlined Gidji I TSF. Further seepage and groundwater management will not be required in closure provided that the Gidji II and III TSFs are closed with their liners intact, where they would be expected to have no influence on groundwater conditions.

10.3.5 Monitoring Methods and Frequencies

Management of seepage associated with TSFs will require groundwater monitoring to continue at an adjusted frequency during the closure period in accordance with approvals that are current at the time.

Monitoring will be conducted in accordance with existing KCGM water monitoring procedures. Where required, water samples will be collected and preserved in accordance with the requirements of *AS/NZS 5667.1-1998 (Water Quality – Sampling – Guidance on the design of sampling programmes, sampling techniques and the preservation and handling of samples).* All water samples will be submitted to a laboratory with current National Association of Testing Authorities (NATA) accreditation for the analysis undertaken. Samples will be analysed in accordance with the current "*Standard Methods for Examination of Water and Wastewater – APHA-AWWA-WEF*".

Post closure, monitoring frequencies will be adjusted to a frequency to reflect the closure criteria, and in accordance with any legal requirements that may be active at closure. Table 10-2 outlines conceptual groundwater monitoring frequencies for Fimiston and Gidji TSFs.

Table 10-2: Conceptual Groundwater Monitoring Frequencies

MONITORING SITES	SAMPLING FREQUENCY	PARAMETERS
Fimiston TSFs		
A selection of production bores (if required by licences)	Annually, subject to review and licence requirements	pH, EC
A selection of monitoring bores	Annually, subject to review and licence requirements	pH, TDS/EC Free cyanide, WAD cyanide, Total cyanide, selected metals (if required), standing water level
Gidji TSF		
A selection of monitoring bores	Annually, subject to review and licence requirements	pH, TDS/EC Free cyanide, WAD cyanide, Total cyanide, selected metals (if required), standing water level

Note: Gidji groundwater bores may be dry prior to closure

10.3.6 Removal of Chemicals and Decontamination of Site

During decommissioning and demolition, chemicals and reagents will be removed from site and appropriately disposed of, with these actions recorded and confirmed within the demolition close out report.

Contaminated Sites have been identified within the KCGM site and will require monitoring as part of the requirements of that Act. A suitably qualified Contaminated Sites professional(s) will complete the assessments.

10.4 Sustainable Land Use

10.4.1 Vegetation Monitoring

From 2001 to 2011 KCGM used Ecosystem Function Analysis (EFA) to monitor the progress of rehabilitation. In 2012 to 2014, KCGM commissioned a third party to independently review KCGM's rehabilitation monitoring data and methodologies in relation to effective assessment of vegetation status and its linkage to closure criteria. KCGM commissioned a third party to independently review KCGM's rehabilitation monitoring data and methodologies in relation to effective assessment of landform stability and its linkage to closure criteria. This has been an ongoing project for some time and has had several iterations. Further adjustments are possible if new information is identified.

KCGM is moving to a more holistic view of monitoring. Monitoring commences with the quality assurance of rehabilitation activities against planned design. Due to the high salinity of the rehabilitation materials, further work is being conducted on:

- Salinity, and the linkage between salinity and revegetation success. Early findings show a direct correlation between salinity and plant density;
- Vegetation monitoring (see Section 10.3.6), in a format that has better alignment with the completion criteria and at frequencies that are appropriate for the rainfall/vegetation patterns of the Goldfields.

Outcomes of this work have led to the development of a monitoring program that involves qualitative photographic monitoring along with comparison of quantitative measures of vegetation community structure at rehabilitated sites to a range of values obtained from local vegetation communities surrounding the mine.

Qualitative data are recorded in 20 x 20 m quadrats as has previously been collected for rehabilitation and approvals assessment across the site for several years. For each quadrat the following data are recorded:

- Location – the geographic coordinates of all four corners of the quadrat in WGS84 projection;
- Description of vegetation – a broad description utilising the structural formation and height classes based on National Vegetation Information System (ESCAVI 2003);
- Habitat – a brief description of landform and habitat;
- Geology – a broad description of surface soil type and rock type;
- Height and percentage foliage cover (PFC) – a visual estimate of cover of total vegetation cover, cover of shrubs and trees >2 m tall, cover of shrubs <2 m, total grass cover and total herb cover;
- Photograph – a colour photograph of the vegetation within each quadrat in a south-easterly direction from the north-west corner of the quadrat;
- Flora species list – comprehensive list of all flora species recorded within the quadrat; and
- Evidence of plant reproduction including:
    - presence of flowers or fruit on established species;
    - presence of seedlings of mature species; and
    - presence of age classes for species recorded.

Quantitative floristic data are collected in 1x1 m quadrats placed randomly throughout the rehabilitated area. Quadrat locations are permanently marked in the north-west corner by metal post for relocation in subsequent surveys. Data collected comprises:

- name of all species present in the quadrat;
- density of each species present; and
- visual estimate of the projected foliage cover of each species present.

From this data quantitative measures are attained for each species and for the whole community (Table 10-3). It should be noted that the term species richness refers to the total number of species recorded for a site. The quantitative floristic data is then used to measure the success of the rehabilitation towards the closure outcome and criteria by comparison to the qualitative and quantitative measures that have been obtained from analogue communities. In total eight criteria are used to assess the completion of rehabilitated areas, four qualitative measures and four quantitative measures:

Table 10-3: Quantitative Measures Attained from Rehabilitation Monitoring

COMMUNITY MEASURES	SPECIES MEASURES
Species richness. Mean plant/foliage cover per site. Mean density (plants m^2) per site. Proportion of community floristics (cover, density, diversity, and frequency attributable to dominant species).	Mean cover of each species per site. Mean density of each species per site. Relative density (RD) of each species. Relative frequency (RF) of each species. Relative cover (RC) of each species. Importance value index (IVI) for each species.

10.4.1.1 Qualitative Criteria Measures

10.4.1.1.1 Community Structure

Community structure is a qualitative measure obtained from the 20 × 20 m quadrat survey. The criteria are based upon the desired outcome that the rehabilitated community contains each of the flora stratum of analogue communities. The vegetation description of the rehabilitated area is compared to those of analogue communities to determine whether the community structure of the rehabilitated area is commensurate with analogues. If it is, the rehabilitation is rated as 'satisfactory' for this criterion.

10.4.1.1.2 Aesthetics

This criteria are based upon the desired outcome that the rehabilitated area is aesthetically pleasing and blends with the surrounding natural landscape. The photograph taken of the vegetation in the 20 x 20 m quadrat is compared to photographs of analogue communities to identify that the rehabilitated community resembles the natural native vegetation. If it is, the rehabilitation is rated as 'satisfactory' for this criterion.

10.4.1.1.3 Evidence of Plant Reproduction

The measures obtained provide qualitative data that indicate that the established rehabilitated community is attaining self-perpetuance:

- Presence of flowers and/or fruit – indicates mature plants are attaining a capacity to produce a soil seedbank.
- Presence of seedling of mature plants – indicates mature plants have come full cycle and have set viable seed that has germinated and produced offspring.
- Presence of age classes of plants – indicates mature plants have come full cycle and have set viable seed that has germinated and produced offspring.

A 'satisfactory' rating for this criterion is achieved when one or all of these factors are recorded in rehabilitation.

10.4.1.1.4 Weeds

The presence and the composition of weed species is a qualitative measure recorded for both the 20 x 20 m quadrat and 1 x 1 m quadrat surveys.

A 'satisfactory' rating for this criterion is achieved by having no Declared or Weeds of National Significance within rehabilitation.

10.4.1.2 Quantitative Criteria Measures

10.4.1.2.1 Total plant density, species richness and foliage cover

Plant abundance including metric parameters such as plant density, species richness and foliage cover are two of the most commonly employed completion criteria for rehabilitation world-wide (EPA 2006). The criterion arises from the desired outcome that the rehabilitated community resemble natural communities (EPA 2006; Young 2019). Data for this criterion are derived from the 1 m x 1 m quadrat surveys with mean values derived for each site. The mean value for the rehabilitated community is compared directly with mean values for analogue communities.

A 'satisfactory' or above score is achieved by the value in rehabilitated area being equivalent to at least one of the analogue communities. An 'excellent' rating is achieved by the value of a rehabilitated area being equivalent to or exceeding the mean for all analogue communities.

10.4.1.2.2 Keystone Species

Data for this criterion are derived from the 1 m x 1 m quadrat surveys with Keystone species identified utilising the dominance index. This criterion has been included as keystone species provide essential ecosystem function (EPA 2006).

To achieve a 'satisfactory' rating for this criterion, the majority of dominant species in the rehabilitated area must also be dominant or have been recorded in an analogue community. An 'excellent' rating is achieved by all dominant species in the rehabilitated area also dominant or recorded in an analogue community.

10.4.1.3 Fauna Monitoring

The fauna that occur with the KCGM area do not have any specific habitat requirements post closure other than the return of a modified landscape as proposed by the vegetation closure outcomes. As such, the completion criteria for vegetation are considered adequate to assess achievement of closure objectives for fauna, and no formal fauna survey program is proposed. However, opportunistic observations of fauna presence will be recorded during vegetation monitoring when noted during field work, including sightings, scats, tracks etc.

10.4.1.4 Monitoring Frequency

Rehabilitation monitoring frequency is dependent on a range of criteria, such as age of rehabilitation and current success. Field vegetation, fauna and erosion assessment will be conducted initially, with annual qualitative photographic monitoring being conducted to determine when sites are likely to have reached closure criteria,or require remedial works.

The intensity of monitoring methods, spatial distribution and frequency of monitoring will adapt to the ongoing rehabilitation monitoring results. Rehabilitation monitoring techniques are undergoing rapid change and are likely to change substantially prior to closure of KCGM.

10.5 Legal Compliance

Collation of legal requirements and commitments is conducted as part of each triennial update of the MCP. An audit of compliance against these commitments will be completed prior to the submission of the final detailed MCP by a suitably qualified professional. A summary of this audit will be provided within the Final Relinquishment Report.

10.6 Closure Planning

Closure Planning at KCGM is integrated with the mine planning process and reported on annually within the Annual Environmental Reports. It should also be noted that closure planning and provisioning is audited annually as per financial requirements. It is anticipated that towards the end of the operational period an additional 3rd party review will be conducted of the completed rehabilitation to date, and any remaining to be completed as part of the closure process, to assess adequacy and appropriateness in achieving the closure outcomes and criteria. The outcomes of this review will be included within the final submissions of the MCP and any post closure reporting.

10.7 Stakeholder Engagement

During operations, KCGM undertakes monitoring and measurement of its engagement activities to ensure engagement has been successful. These include:

- Implementation of the Community Engagement Plan;
- Implementation of quarterly Local Voices pulse surveys, measurement of data and inclusion of proactive initiatives within KCGM's operations;
- Quarterly inclusion of rehabilitation question in Local Voices pulse survey and comparison of data;
- Implementation of SIMP initiatives
- Number of engagement opportunities with key stakeholders;
- Stakeholder expectations considered and incorporated into the MCP where appropriate;
- Agreement by stakeholders on final post mining land uses;
- Identification and response to community concerns through KCGM's contact channels or engagement opportunities – primarily complaints via KCGM's 24-hour Public Interaction Line;
- Measurement of social media statistics including post engagements and comments;
- Measurement of website statistics on relevant pages, e.g. closure, environment, publications;
- Number of visitors at the Super Pit Lookout (traffic counter in place during December 2020 and April 2021);
- Number of public tours visiting KCGM's operations.

It is envisioned that monitoring of metrics similar to this will continue during the post closure period until final relinquishment.

10.7.1 Local Voices

In mid-2019, KCGM engaged research group Voconiq (formerly part of CSIRO) to implement the Local Voices initiative over 3 years. Local Voices uses periodic online surveys and face to face consultations to give the people of Kalgoorlie-Boulder an opportunity to have a direct voice in expressing their views and experiences of KCGM.

KCGM tailors the engagement and ongoing surveys to focus on specific areas of interest to the operation to understand sentiment or further explore areas which are highlighted through community feedback. This approach helps to build trust and transparency between the local community and KCGM, strengthen relationships and increase understanding on both sides.

Local Voices allows the specific measurement of key aspects of the relationship between KCGM and the community regularly over time to show performance as perceived by the community. Data collected during the surveys is utilised to guide KCGM's community engagement plans, MCP, community investments and regulatory submissions for key growth projects.

From the recent pulse survey in August 2020 (Figure 4 5) the results pertinent to closure include:

- KCGM's impact on the environment has decreased.
- Being responsive, particularly regarding environmental impacts, remains important in building and maintaining trust.
- KCGM's contribution to the future prosperity of the region is viewed positively.
- KCGM's contribution to local business opportunities is viewed positively.
- Trust and acceptance of KCGM remain strong and steady.
- Most (64%) felt KCGM is committed to the Kalgoorlie-Boulder community.

KCGM may include a program similar to Local Voices post closure to ensure that all relevant stakeholder concerns are considered.

11. FINANCIAL PROVISION FOR CLOSURE

This section of the MCP details the processes undertaken to adequately financially provision for closure at KCGM.

The majority of mine closure activities take place when there is little or no economic return from the mining operation and there may be little cost value/resale in the remaining assets. The DMIRS therefore requires mining proponents to provide an estimate of costs expected to be incurred to implement an approved plan in the event the proponent defaults on their mine closure obligations. The closure costing element of the DMIRS Mine Closure guidelines has been reviewed and considered in the preparation of the estimates relating to KCGM. The guideline indicates that the process and methodology for calculating the cost estimates must be transparent and verifiable, and that cost must be reviewed regularly. As such, this MCP is required to contain a summary of mine closure costing methodology, assumptions and financial processes to demonstrate to DMIRS and/or the DWER that KCGM has properly considered and fully understood the costs of meeting closure outcomes identified in the plan and made adequate provisions in corporate accounts for these costs.

As Northern Star, the current owner of KCGM, has annual financial reporting requirements to the ASX, closure cost estimates are audited internally annually and on a regular basis by reputable 3rd party financial auditors.

In addition to the requirement to provide a mine closure cost estimate for regulatory purposes, ASX and international accounting practice requires that companies regularly report liabilities associated with the asset retirement obligation (Australian Accounting Standards Board [AASB] 137). The level of detail of closure liabilities vary somewhat by jurisdiction, but generally require a cost estimate based on the costs that would be incurred by a third party to carry out the required mine closure activities.

As such, KCGM undertakes an annual review of the estimated cost of closure of the site utilising a costing model, underpinned by costings based on first principles using third party contractor rates. This process occurs as part of the annual budget cycle, prior to the end of the financial year. The closure financial provision is based on the costs to rehabilitate the current operational disturbance and landforms constructed at the end of a particular year.

11.1 Accuracy of Closure Cost Estimates

The criteria for the closure planning process are rigorous enough to support project planning, satisfy the legal requirements and support engineering cost estimates for implementing the most probable closure scenario. Depending on the length of time to closure, the accuracy differs based on the level of detail within the estimate. During Planning and Development and Mining phases, a confidence level of ±30% is generally applied. Within two years of planned closure (i.e. at end of mining and during post mining phases), the cost estimate should have a confidence level of ±15% (at project implementation phase, most projects have a 10% accuracy).

11.1.1 Planning and Development

The accuracy of closure cost estimates developed during the planning and development stage is usually dictated by the requirements for financial investment (feasibility) or permitting (financial assurance), and may be based on professional judgment and corporate experience. Some components of the cost estimate, such as long-term management costs are best estimates in today's dollars. These cost estimates are refined over time, but are accurate enough to enable assessment of design alternatives evaluated during feasibility and design.

11.1.2 Mining

As the mine enters the operational phase, data collected from the monitoring programme and experience gained from operations and progressive rehabilitation, closure and decommissioning works should be incorporated into revisions of the MCP and cost estimates. Regular budgeting and reconciliation of required activities should provide a basis for improving the effectiveness of the MCP and accuracy of the estimate. As the effectiveness and costs of activities is better defined through monitoring of finished work, the MCP should be improved through regular review and updates. Consequently, the closure cost estimate will also be improved with respect to both content and accuracy as the project progresses. KCGM is currently in this stage of estimation accuracy.

11.1.3 Post-Mining

By the time the operation enters the post-mining phase, the effectiveness of the rehabilitation, closure and decommissioning works should have been refined to the point where the success of the activities and the actual costs should be predictable works that have been done progressively. As a result, the mine closure cost estimate should have developed to the point that it can be used for contract budgeting and management.

11.1.4 Mine Closure

Following cessation of mining activities and an appropriate post-mining monitoring period, the MCP and cost estimate should be limited to those activities required to achieve mine closure. Because some of these activities may include long-term maintenance and management requirements, some portions of these cost estimates may necessarily be based on judgment or stochastic methods, and given the potential long-term risks, may require the use of somewhat conservative assumptions.

11.2 Cost Estimation Methodology

The methods of calculation for Closure Provisioning at KCGM are based on first-principle approaches for volume, distance and productivity. Volumes and machinery calculations are done from first principles, with the use of Mine Planning software such as Vulcan or Deswik. For each domain and feature physical measures (e.g. areas, volumes and lengths and widths) are ascertained from spatial images, engineering drawings, approvals documents and in some cases field measurements. Productivity calculations used are largely derived from published sources such as the Caterpillar Performance Handbook.

The cost model has been developed to align with the MCP whereby the Project is divided into the domains which deal with the various spatial and post closure aspects of the Project. Each domain is further divided into features, which are generally defined by spatial or specific management area boundaries. Each feature has activities to be costed which align with those listed in the MCP Chapter 9 Closure Implementation which combine units of measure and costs to form an estimate.

The following are taken into account in the estimate:

- Unit costs derived from a schedule of unit rates complied by a 3rd party professional cost estimator. Site contract rates or relevant cost experience in the region may also be used
- Mobilisation and demobilisation are accounted for;
- Seed mix is costed based on previous charges ($/kg);
- Activity costs as a combination of units of cost and are measured in lengths and areas or unit of service (e.g. hectares seeding, report preparation);
- Indirect costs (e.g. project management, supervision, trade labour);
- Post closure monitoring and maintenance obligations;
- Professional or technical assistance eg geotechnical engineer or TSF engineer are also costed.
- Contingency to allow for uncertainty in estimations.

Cost estimates are placed in a schedule based on the current intended operating life of the project and of the intended completion timeframes of the work based on the site's rehabilitation works plan. As mining and progressive rehabilitation is completed the schedule will be updated. Cost estimation is an ongoing process and will be updated during the life of the project. KCGM reviews and refines the closure cost estimate on an annual basis or where a significant project change has occurred to take into account:

- inflation;
- additional site data collected as part of monitoring programmes;
- site experience with closure activities;
- improvements in industry knowledge and practices;
- modifications to the Plan and work requirements; and
- changes to regulation of financial reporting requirements.

11.2.1 Equipment Rates

Labour and plant/machinery rates are updated annually by an independent engineering cost evaluator. Equipment cost rates are based on full life of equipment calculations as against general plant hire rates and include the following:

- Ownership Cost:
    - Finance = depreciation of CAPEX;
    - Interest on borrowed capital (or Return on investment if own capital is used);
    - Insurance;
    - Registration/Licencing if required; and
    - Maintenance Costs:
        - Major Maintenance and major component replacement (for the full life of plant);
        - Track repair & maintenance spares;
        - Major repair labour cost;
        - Tyre cost;
        - Maintenance spares; and
        - Maintenance labour cost
- Operating Costs:
    - Fuel;
    - Oil & Lubrication;
    - Replacement of Ground Engaging Tools (GET); and
    - Workshop or plant hire company overhead cost (if applicable).

The rates are calculated on a conservative number of hours per month, hence gives higher than expected costs. The more conservative approach taken with calculating rates compensates for the productivity inefficiencies forced on closure crews by virtue of noise and dust constraints adjacent to the City of Kalgoorlie-Boulder. Labour rates are based on a WA industry base pay rate plus provision for unemployment insurance, workers' compensation and State Payroll tax.

11.2.2 Assumptions

The following assumptions have been applied to the cost estimate:

- The closure cost estimate includes costs for all physical works that KCGM will be responsible for undertaking in implementing the MCP (i.e. those listed in Chapter 9 of this document) based on the conditions and commitments which are in existence at this time.
- Owner's management costs or those costs that will be incurred by KCGM in supporting the closure program (accommodation, management etc.) have been estimated.
- The closure cost estimate is developed in current financial year dollars (AUD).
- Specialist earthworks contractors may be required where the internal mining fleet is not available to undertake closure earthworks such as ripping and seeding.
- All costs associated with closure planning, design, reporting and related professional costs after cessation of Project.
- Post closure costs (including environmental monitoring and reporting, rehabilitation maintenance and lease payment costs) have been estimated to continue for 10 years beyond the cessation of commercial production. Costs have been scaled down appropriately over this period. It is assumed that lease relinquishment or sale will be achievable within 10 years.
- Costs have been estimated for the current footprint liability as for 2020 MRF. Costs can be included / excluded from the final closure cost estimate progressively as the project expands or progressive rehabilitation is carried out.

After calculation, financial specialists add allowances for inflation to closure, calculation of net present value, or amortising and other standard accounting calculations.

11.2.3 Limitations

The estimate excludes:

- All costs associated with redundancies, repatriation, retraining and outplacement of the KCGM workforce and of any contractors' workforce.
- All costs associated with sudden or unplanned closure.
- All costs associated with care and maintenance or preservation activities.
- All costs associated with disposal of stores inventory.
- All costs associated with removal of KCGM non-fixed, redundant equipment and scrap; it is assumed that this will be removed prior to closure.
- No cost offset has been assumed for the resale of any assets or scrap. Return on sale of assets or salvage value are difficult to predict, particularly at remote locations, and ANZMEC and MCA (2000) recommend that these should not be used to offset the cost of reclamation and closure.
- All costs associated with closure planning, design, reporting and related professional costs prior to cessation of Project.
- All costs associated with any change in closure obligations which may arise during the life of the operation or after closure.

11.3 2020 Cost Estimate

Due to commercial sensitivities, KCGM has not included the actual cost estimate within this MCP. In lieu of the cost model, the calculated Rehabilitation Liability Estimate (RLE) from the latest submission to the MRF has been included below in Table 11-1.

Table 11-1: KCGM MRF Rehabilitation Liability Estimate 2020

FEATURE	RLE	DISTURBANCE (HA)
Roads & Service Corridors	$8,108,840	450
Black Street Coreyard	$69,827	4
Block 45/Fuel Farm	$376,188	13
Cassidy Headframe and Workshops	$59,178	2
Catchpit	$466,275	16
Contractor and Site Storage Area	$39,469	2
CSI Crushing	$419,053	14
Eastern Borefield	$310,550	17
Environmental Noise Bund	$148,037	74
ERT Training Area	$7,011	0
Explosives Magazine	$7,124	0
Fenceline	$15,527	1
Fimiston I	$5,694,901	137
Fimiston II	$16,577,931	399
Fimiston Open Pit	$9,392,788	318
Fimiston Processing Plant	$1,135,947	38
Fimiston Security	$64,033	4

FEATURE	RLE	DISTURBANCE (HA)
Gidji I & II TSFs	$2,096,924	51
Gidji Processing Plant	$173,061	6
Growth Media Stockpile	$135,130	68
H Dam	$47,113	11
Kaltails TSF	$11,463,672	303
Kaltails Supply Borefield	$590,627	33
Lakewood Trenches	$47,214	3
Laydown	$13,849	1
Marginal and Low Grade Dump	$4,749,282	158
Morrison Dewatering Bore Infrastructure	$56,900	3
Morrison's Flats	$4,556,636	125
Mt Charlotte Coreyard	$170,748	10
Mt Charlotte Glory Hole	$89,343	5
Mt Charlotte Old Pipeline Corridor	$31,808	2
Mt Charlotte Pipeline Corridor	$8,557	0
Mt Percy (E)	$6,575	3
Mt Percy Gravity Dam	$26,625	1
Mt Percy Infrastructure Area	$52,775	26
Mt Percy Mystery Waste Dump	$11,694	6
Mt Percy Pits	$1,029,036	34
Mt Percy ROM Pad	$16,563	8
Mt Percy Sir John Pit	$13,382	2
Mt Percy Sir John Waste Dump	$38,094	19
Mt Percy TSFs	$109,516	55
Mt Percy Union Club Waste Dump	$27,151	14
Mullingar Historical TSF	$48,639	2
North East Waste Dump	$6,659,757	253
Northern Dump Potable Water	$22,621	1
Northern Waste Dump	$2,524,843	86
Old Exploration Laydown	$7,776	0
Open Pits Administration	$ 51,649	3
Open Pits Contractor Workshops	$340,545	11
Open Pits Laydown	$428,587	24
Oroya Waste Dump	$3,559,526	189
Overland Conveyor	$72,990	4
Paringa TSF/Biopad	$951,100	19
POW 68355	$3,379	2
Public Lookout	$132,323	7

FEATURE	RLE	DISTURBANCE (HA)
ROM Pad	$452,981	25
Sam Pearce Laydown	$14,555	1
Sam Pearce Surface Workshops	$43,635	1
Supply/Stores Laydown	$56,135	3
Trafalgar Waste Dump	$21,091,119	587
Trafalgar Waste Dump Other	$5,731	0
Vent Shaft	$5,483	0
Grand Total	**$104,928,326**	**3655**

12. MANAGEMENT OF INFORMATION AND DATA

KCGM have an Environmental Management System (EMS) in place, which includes a document management system.

All older information related to rehabilitation and closure at KCGM are catalogued and archived. Key documents have been digitally scanned prior to storage. More recent data and reports are stored digitally on a server, with appropriate back up procedures and a naming convention/document control system. These systems comply with the respective Corporate Standards which in turn are based on international best practice in order to comply with stringent North American financial management codes. All closure related material is, where possible, linked to the GIS database closure cost model providing an effective audit trail. The existing EMS system is currently being upgraded, and documents are likely to be migrated to this system at a later date.

Monitoring data is currently stored in an MP5 database, with appropriate server backup.

At closure the most appropriate final location for this documentation will be selected, where it can be retained for reference purposes.

13. REVIEWED MINE CLOSURE PLANS

As required by DMIRS guidance on the development of MCPs, this section discusses the changes to the MCP since last submission (2018 Resubmission in December 2019), responses to regulator comments and knowledge gaps.

13.1 Changes to the MCP

KCGM Mine Closure Plan was first submitted in 2010. Since this original submission, each version has evolved and adapted to developing knowledge, mine plan changes and legislative changes.

Table 13-1 outlines the changes to the MCP since resubmission of the 2018 version in December 2019. Major changes have occurred to the document structure, to align with the Statutory Guidelines and to assist the reader. Further information has been provided on activities and developments that have occurred at the mine since the last submission, including data from closure studies and trials. Additionally, the document has been edited and reviewed in light of the comments received from DMIRS and DWER on the 2018 submission of the MCP.

Table 13-1: Changes to this KCGM MCP

Section of MCP	Changes made to 2022 MCP Revision
Entire document	Update dates and other items to reflect currency
Section 5 – Closure Data	Reviewed & updated, to reflect current LOM plans for Fimiston (in particular Fimiston South project) and Gidji TSFs
Section 9	Reviewed & updated, to reflect current LOM plans for Fimiston (in particular Fimiston South project) and Gidji TSFs
Section 9.7.4 & 10.1	Added information on safety remediation of historic voids, as recommended by DMIRS
Section of MCP	**Changes made to 2021 MCP Revision**
Entire document	Restructured document to meet current DMIRS guidance.
Entire document	Corrected for typographical and other errors.
Section 2 - Project Summary	Updated tenement list and ownership details.
Section 4 - Stakeholder Engagement	Reviewed and updated section with additional / current information.
Section 5 - Closure Data	Reviewed and edited to update data and add further detail.
Section 5.1 - Natural Environment & 5.2 - Cultural Heritage	Each sub-section has been edited to add further context on the information provided relating to closure.

Section 5.3 - Mining Environment	• Detail previously included in the Closure Implementation Work Plan Appendix (rehabilitation performance etc.) has been included to provide more information and background context for each feature.
	• Reviewed and edited to update data and add further detail regarding
	  ○ Fimiston Pit Geotechnical Stability.
	  ○ Fimiston Pit Lake model development.
	  ○ Waste rock and tailings geochemistry of Fimiston South expansion.
	  ○ Fimiston TSF design drawings.

Section 5.4 - Contaminated Sites	• Further information and risk ranking provided for several ZOI/AOC based on a Preliminary Site Investigations conducted in 2020. • Updated with work conducted between 2018 -2021. • Section reviewed and reworded to improve readability.
Section 5.5 (7.5 previously) - Rehabilitation Trials	• Knowledge Gaps and Projects sections moved to Chapter 13 as per DMIRS guidance.
Section 6 - Post Mining Land Use and Closure Objectives	• Detail on consultation regarding PMLU added

Section of MCP	Changes made to 2022 MCP Revision
	• Detail on specific approaches to PMLU updated to reflect regulator comments on the 2018 submission.
Section 7 - Identification and Management of Closure Issues	• Updated to reflect changes in risk matrices due to change in KCGM ownership. • Risk ratings altered to reflect change in risk matrix. Pit Wall instability has been moved into the highest risks due to a change in ranking.
Section 8 - Closure Outcomes and Completion Criteria	• New version of completion criteria • Significant edits and updates to the closure criteria in Table 8-1 to reflect regulator feedback received on the 2018 submission.
Section 9 - Closure Implementation	• Reviewed and revised figures and tables to include 2018-2021 timeframe and new information. • Reviewed and revised structure of sub sections for consistency and improved flow. • Information previously in Appendix 7 incorporated into Section 9 • New information relevant to current LOM and material Mining Proposals
Section 9.2.2.3.2 and 9.2.2.3.3	• Outcomes of further geotechnical work for Fimiston pit abandonment presented
Section 9.2.2.3.4- Fimiston Pit Lake	• Updated to reflect revised Pit Lake model conducted in 2020/1, including predictions of final water quality.
Section 9.2.3.4 - Detailed WRD Design	• Reviewed and reworded section to improve readability and reduce duplication of information. • Added figures to illustrate conceptual WRD design, including cross sections (previously in Appendix 7). • Updated to align with Fimiston South Mining Proposal
Section 9.2.3.5 - Rehabilitation	• Added information to demonstrate progressive rehabilitation progress in the period 2018 -2021
Section 9.2.4.5 - Information Gaps	• Updated to reflect approvals and progress with closure strategy since last submission.
Section 9.2.5.3.3 -	• Added detail on waste rock availability for closure of Fimiston II and Kaltails. • Updated to align with Fimiston South Mining Proposal
Section 0- Fimiston TSF Information	• Added further detail on design and Fim IIE TSF information.
Section 9.2.5.7 - TSF Closure Implementation Status	• Updated to reflect progress on progressive rehabilitation.
Section 9.6.2.6 - Rehabilitation Materials	• Updated to reflect progress on projects and revised timeframes.
Section 9.3.1 – Mt Charlotte Mining Infrastructure	• Updated Mt Charlotte buttress and abandonment design
Section 9.5.1 - Mt Percy Mining Infrastructure	• Updated Mt Percy buttress and abandonment design
Section 9.4.2 – Gidji TSF Domain	• New studies and design work included
Section 10 - Closure Monitoring And Maintenance	• Significant review and revision have occurred to address feedback from DMIRS and DWER on the linkages between closure criteria and monitoring programs.
Section 101 – Financial Provisioning	• Updated and included more detail on the methodologies and assumptions for the current used cost model as requested by DMIRS.

Section 13 - Reviewed Mine Closure Plans	• Added this section as per DMIRS guidance requirements.

13.2 Regulator Comments

Comments from DMIRS and DWER on the 2018 submission are addressed in Table 13-2 and Table 13-3 respectively (a resubmission of the MCP was provided in December 2019). The reader should note that the feedback has been addressed partially in the 2018 resubmission and partially in this 2021 submission of the MCP.

Table 13-2: DMIRS Comments to be addressed in 2021 and KCGM Responses

Section of MCP	DMIRS Comments	KCGM Response
Project Summary	Please include a full list of the tenements for which this MCP is being submitted in the next revision.	This was submitted as Appendix 2 in the 2018 MCP. Has now been included as Table 2-3 in the main document.
Identification of Closure Obligations and Commitments	Reference has been made to the KCGM Closure Legal and Other Obligations Register; however, a copy of this has not been provided. Please include a copy of the Register as an Appendix to the next revised version of the MCP.	This was submitted as Appendix 3 in the 2018 MCP. It is included as Appendix 1 in the 2021 submission.
Stakeholder Consultation	The next MCP revision must include an analysis of any stakeholder gaps and incorporation of these gaps into the Consultation Plan. Proposed timeframes and methods to close out the gaps should be included. An example of a Stakeholder gap might be the uncertainty surrounding the post-mining land use for Mining and Processing Infrastructure (industrial land use has been proposed but would depend partly upon GeoSurvey support).	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. Thereafter, discussions were held with GeoSurvey and Dept of Lands in late 2019, which allowed for the firming up of the Closure Objectives and underpinning philosophy of end land uses that will not preclude future mining. Stakeholder section updated with this information
	A full Closure Stakeholder Consultation register has not been provided. This should be included as an Appendix to the next MCP and should include dates, stakeholder involved, comments and outcomes.	This was submitted as Appendix 4 in the 2018 MCP. Older consultation is included as Appendix 2 in the 2021 submission and more current information is within the Stakeholder Section. In MCP 2022, Stakeholder Consultation register reformatted and added to main document
	Having a pit lake adjacent to a town site will present a significant safety issue with people likely to want to access it for recreation purposes. These risks need to be addressed in the Stakeholder Consultation section as public safety for a large pit lake immediately adjacent to a town site will require ongoing management by another party following relinquishment e.g. the Shire. Strategies to reduce the risks as much as possible must be discussed e.g. fencing, security monitoring or other methods to prevent access.	Noted. Discussion of the Closure strategy and implementation of measures for abandonment of Fimiston Open are discussed in the Fimiston Mining Infrastructure Domain, Chapter 9 (Vol2) and well as Section 7 (Risk), Vol1).

Section of MCP	DMIRS Comments	KCGM Response
Post-mining Land Use	It is stated within the section for 'Mt Percy' that "*where they are stable, passive land use options that are compatible with the requirement to minimise erosion and protect vegetation could be considered".* It is a closure requirement that all landforms be safe, stable and non-polluting. Please clarify what "passive land uses" consist of.	Post mining land use at KCGM will be a combination of: • Rehabilitated modified landscapes; and • Zones of restricted access due to safety. In line with this, the reference to 'passive land uses' for Mt Percy has been removed.
	Numerous references have been made regarding "future mining activities". Please note that the MCP is required to address closure of all current mining disturbances, if another entity takes over the Project/commences mining in the area post-closure then it is expected that they will either update the current approved MCP for the site or create a revised MCP prior to commencing any operations. The post-mining land use/MCP should not account for post- closure activities that have not been addressed through submission of a Mining Proposal or Notice of Intent. Rehabilitating landforms (WRDs, TSF etc.) and managing pit voids will not sterilise any resource for future exploration or mining activities.	Due to the unique location and highly prospective nature of the Golden Mile, KCGM have thought it prudent to highlight the very likely possibility that mining will continue at the site in some capacity for the foreseeable future. However, this does not preclude progressive rehabilitation and planning for closure, which is reflected in the post mining land uses listed in Table 5-1. These were agreed with key stakeholders.
Closure Objectives	The Closure Objectives must address remediation of contaminated land, surface water quality and groundwater impacts.	Significant review and revision of closure objectives and criteria has been completed, including addition of remediation of contaminated land, surface water quality and groundwater impacts.
	The Objective "Inadvertent access to shafts created by KCGM that present a risk, based on post closure land use, is minimised in accordance with Mines Safety and Inspection Regulations 1995" is unclear. Please address the following comments in a revised objective: • What is meant by the term "*that present a risk"*? Wouldn't all shafts potentially present a risk? What is meant by "*based on a post-mining land use*"? All the post-mining land uses proposed in this MCP would require that all shafts be made safe to prevent inadvertent access by members of the public or fauna.	Reworded to: *Inadvertent access to shafts created or used for KCGM operations (post 1988) is minimised in accordance with Mines Safety and Inspection Regulations 1995.* This makes clear the distinction of operational shafts (Mt Charlotte ventilation etc.) from legacy shafts throughout the whole area. KCGM makes these safe during operations but will not continue to do so after operations cease.
	The objective "mined waste will be managed so as to minimise local environmental impacts" is too vague. Please address the below comments in a revised objective: • What is "mined waste" referring to? Waste rock? Tailings material? Mine landforms? What is the cause of the potential impacts e.g. Acid Mine Drainage, erosion, saline seepage?	Discussions with the EPA in late 2019 have allowed for a review and refresh of the Completion Criteria. In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management.

Section of MCP	DMIRS Comments	KCGM Response
	What “local environmental impacts” is this referring to? Impacts to groundwater? Soil contamination? Etc.	
Development of Completion Criteria	This Project has been in operation for a long period of time and until the 2018 LOM Plan was published, the life of Fimiston Pit was proposed to be 2019 (currently extended to 2026). Given these aspects it would be expected that the Completion Criteria would show a greater degree of refinement and meet the S.M.A.R.T principle. However, the Completion Criteria show little change from the 2012 Mine Closure Plan criteria. The Criteria must be updated and refined prior to the next MCP submission. The completion criteria will need to be refined in future revisions to ensure that they are: • Specific enough to reflect a unique set of environmental, climatic, social and economic circumstances. • Flexible enough to adapt to changing circumstances without compromising objectives. • Suitable for demonstrating rehabilitation trends of environmental indicators. • Acceptable to key stakeholders. • Measurable, achievable and objective. • Based on targeted research / science / trials. Refined during operations / continuous improvement. Please see below for further comments on specific criteria.	In 2019 discussions were held with the EPA regarding KCGM’s previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8.
	The Criterion *“Risk based approach to prevention of inadvertent access, as required by Mine Safety and Inspection Regulations 1995”* is not measurable. More specific details regarding how this will be achieved should be provided. This criterion must be developed in consultation with key stakeholders e.g. the Shire and DMIRS Resources Safety Division. The Open Pit Abandonment Strategy is being used as a Measurement Tool; this should therefore be included as an Appendix to the MCP.	In 2019 discussions were held with the EPA regarding KCGM’s previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8.

Section of MCP	DMIRS Comments	KCGM Response
	The Criterion *"open pit wall designs will have appropriate geotechnical considerations and design criteria"* must provide further clarification regarding what the "appropriate geotechnical considerations and design criteria" consist of. For example, open pits must have abandonment bunds installed that meet the requirements of DMIRS Resources Safety Division and applicable Guidelines, and all public infrastructure must be outside of the pit zone of instability. These requirements must be reflected in the Closure Criteria.	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8.
	The Criterion "*Surface drainage to downstream environments is managed*" is not measurable. Surface water criteria should consider aspects such as; • The reinstatement of surface water flows/drainage. • Engineering standards of permanent water management structures (e.g. geotechnically engineered to meet Probable Maximum Precipitation (PMP) and Probable Maximum Flood (PMF) events). • Surface water quality e.g. from contamination or sedimentation. The measurement tool *"verification that water management features are constructed to specifications"* should define what the 'specifications' are.	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8.
	For the Criterion *"WRD and TSF designs will have appropriate geotechnical and design criteria"* the *"appropriate geotechnical and design criteria"* must be further defined. This Criterion currently does not meet the S.M.A.R.T. (specific, measurable, achievable, relevant and time-bound) principle.	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8.
	The Criterion *"Erosion features do not compromise the integrity of the landform"* is not measurable. Criteria for erosion should address the potential for formation of erosion gullies that may compromise rehabilitation and revegetation outcomes and potentially cause downstream sedimentation issues.	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8.
	The following comments are made regarding the criterion "Mined materials with potential for adverse environmental impacts have been identified and managed in accordance with operating standards": • What is the "mined material with a potential for environmental impact" • e.g. PAF material? Fibrous? Dispersive? Clays? Etc. • What are the Operating Standards? Any standards, management plans, procedures etc. referred to in the Completion Criteria must be included as	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8. Vol 3 App 5 contains several material characterisation reports, including management recommendations

Section of MCP	DMIRS Comments	KCGM Response
	Appendices. Adverse materials should be appropriately encapsulated internally to a waste landform.	
	The following comments are made regarding the criterion "satisfactory vegetation community structures are attained when compared to surrounding vegetation communities": • "Satisfactory" is not measurable. Specific parameters must be provided that vegetation communities will be measured against. It states *"when compared to surrounding vegetation communities".* Will analogue sites be established as comparison sites? If not, how will comparison to surrounding communities be measured?	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8. Details for vegetation monitoring are provided in the Closure Monitoring and Measurement Section 10. These are provisional criteria, which KCGM and specialists have been working towards for several years.
	The following comments are made regarding the criterion "show a statistically favourable comparison of key dominant species with surrounding vegetation communities": • The term "*statistically favourable comparison*" needs to be further defined to make this measurable. • The key dominant species should be outlined in the baseline data section. It states *"when compared to surrounding vegetation communities".* Will analogue sites be established as comparison sites? If not, how will comparison to surrounding communities be measured?	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8. Details for vegetation monitoring are provided in the Closure Monitoring and Measurement Section 10. These are provisional criteria, which KCGM and specialists have been working towards for several years.
Knowledge Gaps	Please conduct and present a Knowledge Gap Analysis within the next revised MCP. It is recommended that all identified gaps be summarised in a table format with proposed strategies for closing them out and estimated timeframes for this.	See Volume 2 Section 13.3 for a discussion of the current knowledge gaps identified for the MCP and progress on closing out those previously identified.
Identification and Management of Closure Issues	The full Risk Assessment register has not been provided (i.e. only the Key Closure Risks have been presented). The full risk assessment must be provided as an Appendix to the next revised MCP.	This was provided as Appendix 5 in the 2018 submission. It is provided as Appendix 3 in the 2021 submission.
Closure Monitoring and Maintenance	The monitoring section must be updated and more detail provided as the Completion Criteria are further refined. The monitoring proposed must be clearly linked to detailed completion criteria and should include interim targets, and thresholds for when investigations/maintenance activities are required to be implemented. More detail should also be provided regarding the maintenance actions that will be undertaken if thresholds are reached and/or completion criteria are not being met.	Section 10 Monitoring and Maintenance has been updated to clearly link to Completion Criteria. Where appropriate, further detail has been provided to outline management actions should thresholds or limits for criteria be reached.

Section of MCP	DMIRS Comments	KCGM Response
Financial Provisioning	Please detail Closure Tasks that have been included in the closure cost estimate in the next revision of the MCP. There should be a clear linkage between the Closure Implementation section and the Financial Provisioning section.	Volume 2 Chapter 11 Financial Provision for Closure has been reviewed and updated to provide a clearer description of the closure cost estimation methodology used at KCGM.
	For each domain, please provide the line items for each activity type, disturbance level and rehabilitation method proposed.	Rehabilitation tasks and activities for the domains and features which have been costed are provided in Volume 2 Chapter 9 Closure Implementation.
	Please ensure post-closure monitoring and maintenance costs are included within the financial provisioning, in addition to aspects such as staffing, management costs, administrative requirements etc. A breakdown of all aspects of closure and rehabilitation that have been considered during the financial provisioning must be included in the next revision of the MCP.	Volume 2 Chapter 11 Financial Provision for Closure has been reviewed and updated to provide a clearer description of the closure cost estimation methodology used at KCGM. This includes a breakdown of the assumptions and limitations of the model.

Table 13-3: DWER Comments to be Addressed in 2021 MCP and KCGM Comments

Section of MCP	DMIRS Comments	KCGM Response
Section 5.2 (Closure Aspects and Objectives) – Objectives for Rehabilitation	The EPA advised in Bulletin 1273 that a key precondition for successfully establishing revegetation is the construction of stable, noneroding, non-polluting landforms that will sustain vegetation. The Plan's second objective for Rehabilitation (Table 6, P36) is "Areas designated for revegetation will provide an appropriate habitat for native fauna consistent with post closure land use." This is considered to be too narrow and doesn't address all of the aspects of the above EPA's advice. *Recommendation: The second Objective should be "Areas designated for revegetation will be stable, noneroding and non-polluting that will sustain vegetation and provide an appropriate habitat for native fauna consistent with post closure land use."*	EPA are requesting that we combine four separate objectives into one; landform stability, impact on local environment, rehabilitation (flora) and rehabilitation (fauna). These are all separately covered in their own outcomes. To address these together would doubling up on the criteria that would be required to be developed under each outcome. KCGM discussed concerns regarding the term 'noneroding' with the EPA in late 2019. Changes to closure Objectives are in alignment with these discussions - the intent behind the wording is appropriate, but it is not achievable to aim for no erosion to occur at all. All landforms, no matter how 'stable' undergo geomorphological processes that produce erosion through the action of rainfall and wind. KCGM would like to suggest reference to more appropriate and achievable phrasing e.g. • 'geotechnical stability' (i.e. not susceptible to mass failure or collapse),

Section of MCP	DMIRS Comments	KCGM Response
		• 'Long term erosion stability and integrity of engineered mine landform covers based geomorphological processes observed within the local region,' • 'landforms containing materials of concern will be managed to minimise impacts to the quality of the surrounding environment.' Section 8 has been updated to reflect these suggested approaches.
Various	In Bulletin 1273, the EPA advised that the proponent should bring forward timelines for studies into the future of the Superpit and pit water, disposal of TSF recovery water, decisions on landuse, community consultation and rehabilitation in order to be in a position to prepare a meaningful rehabilitation and closure plan. The issue of TSF recovery water is only given limited attention in the Plan, and these references are described below including recommendations for change. Section 7.3.2.4 (Fimiston Tailings Storage Facilities) notes that the abstracted TSF groundwater is pumped to the Fimiston Plant to be used in processing. *Comment: Post closure. this water cannot be used for processing and the Plan does not describe how the water will be stored or used post closure.*	In both the 2018 and 2021 versions of the pit lake model, TSF seepage water formed part of the modelling inputs. At closure TSF seepage recovery water, no longer used for mineral processing, will be diverted to the Fimiston Open Pit.
Various	9.2.10 (TSF Seepage Management) notes “Management of seepage is an operational activity, managed through DWER’s Operational Licences. In future discussion, this project will be incorporated into the TSF Closure Planning Strategy.” *Comment: It should be possible to provide a broad strategy on how the TSF recovery water will be dealt with at this time with more specific details provided later in the TSF Closure Planning Strategy.*	In both the 2018 and 2021 versions of the pit lake model, TSF seepage water formed part of the modelling inputs. At closure TSF seepage recovery water, no longer used for mineral processing, will be diverted to the Fimiston Open Pit.
Various	Section 9.3.4.5. covers the TSF seepage management as part of a closure planning strategy, and Table 21 (Standard Decommissioning and Rehabilitation Approach for Fimiston Domain) notes on page 167 for “Seepage Recovery and Water Supply Bores” – “Retain as required during post closure period for seepage recovery”. *Comment: As noted above, it should be possible to provide a broad strategy on how the TSF recovery water will be dealt with at this time.*	In both the 2018 and 2021 versions of the pit lake model, TSF seepage water formed part of the modelling inputs. At closure TSF seepage recovery water, no longer used for mineral processing, will be diverted to the Fimiston Open Pit.

Section of MCP	DMIRS Comments	KCGM Response
	Section 9.4.6 covers the closure plans for Fimiston TSF and 9.4.6.1.6 discusses Groundwater Abstraction and notes that "Post closure, the seepage and groundwater recovery borefields will need to continue operating for a period, until appropriate groundwater outcomes are achieved." *Comment: Post closure, this water cannot be used for processing and the Plan does not describe how the water will be stored or use.*	In both the 2018 and 2021 versions of the pit lake model, TSF seepage water formed part of the modelling inputs. At closure TSF seepage recovery water, no longer used for mineral processing, will be diverted to the Fimiston Open Pit.
Various	Section 9.4.6.2.2 (Planned Work Program) lists several tasks including Groundwater management strategies (part of TSF Decommissioning Plan). Section 9.9 (Schedule of Planned Closure Activities) contains Table 29 which notes that the TSF Decommissioning Plan for Fimiston is planned for 2036. *Comment: It can be assumed from this that managing abstracted seepage will be part of this plan and its status is described as "Ongoing, further refinements planned as discussed, and contingent on finalising the TSF designs for LOM". If further refinement is required, the Plan should be able to report on what is the broad strategy that requires 'further refinement'."* ***Recommendation**: It is considered that the issue of disposal of TSF recovery water is inadequately covered in the Plan. It should be possible to provide a broad strategy in the Plan on how the TSF recovery water will be dealt with at this time with more specific details provided at a later time in either the TSF Closure Planning Strategy or the TSF Decommissioning Plan.*	In both the 2018 and 2021 versions of the pit lake model, TSF seepage water formed part of the modelling inputs. At closure TSF seepage recovery water, no longer used for mineral processing, will be diverted to the Fimiston Open Pit.
Various	The information provided in the closure implementation plans for the TSFs and mining voids is very broad and conceptual. ***Recommendation**: The next revision of the MCP should include the following information:* • *Relevant completion criteria for each feature;* • *Diagrams and cross section of proposed final landform designs;* • *Reference to supporting data which was used in development of landform designs; and* *Details on how erosional issues identified on rehabilitated sections of landforms will be managed.*	**Open Pits (Mining Voids)** Section 9.2.2.3 has been updated and further information has been provided for the design and abandonment of the Fimiston Open Pit. Further work is required to finalise the closure strategy for the Mt Percy Pits. **TSFs** Section 9.2.5 has been updated to provide further detail on the design of the Fimiston TSFs post closure, including supporting data used for design development, and how erosional issues will be managed.
Corporate endorsement (Pvii)	This needs to be signed in the final revised Plan.	Noted.

Section of MCP	DMIRS Comments	KCGM Response
Table 3: Changes to Regulatory Agencies since 2015 MCP Submission	Table 3 notes the EPA Services as a Regulator. This is not correct, and it should be the Minister for the Environment. As well, it suggests that the Western Australian Planning Commission (WAPC) has had a name change – this is not correct.	KCGM has assumed that the change in departments was from 'Office of the EPA' (OEPA; a separate body to the then Department of Environment Regulation (DER)) to 'DWER (EPA Services)' as is listed under the publicly available organizational chart (https://dwer.wa.gov.au/about/org-chart). The WAPC has not changed names, but the overarching department (DPLH) has, this is reflected in Table 3.
Section 4: Stakeholder Engagement	The third Objective (p16) is "Consider- Identify and respond to community concerns to manage potential risks to KCGM's reputation and/or ongoing operations." This suggests that community concerns will only be addressed where there are potential risks to KCGM's reputation and/or ongoing operations. This is a narrow 'condition' for this objective, and it is unlikely that this is what is intended by KCGM. ***Recommendation:*** *Revise the objective to make it about responding to legitimate community concerns.*	Discussions with the EPA in late 2019 have allowed for a review and refresh of the Completion Criteria. See Volume 1 Chapter 6 and 8.
Section 4: Stakeholder Engagement	Section 4.1.2.2 – Community Organisations - the specific groups who have an interest in the operations and closure are not listed in this section. ***Recommendation:*** *This section should list the community groups who have an interest in the operations and closure, including any environmental groups.*	Section 4.1.2.5 has been amended to include local community groups who may have an interest in closure.
Section 4: Stakeholder Engagement	Section 4.1.3 lists the Government Stakeholders. A key Government stakeholder is the Minister for Environment, with respect to the Ministerial Statement. ***Recommendation:*** *The Minister for Environment should be acknowledged as a key Government stakeholder.*	KCGM engages with the EPA Services, but has not specifically engaged directly with the Minister of Environment or his office as part of closure planning.
Section 5: Post Mining Land Use and Closure Objectives	The Guidelines require that MCPs should describe "post-mining land use(s) that has been proposed/agreed with key stakeholders including regulators." As well, the Guidelines require that there should be "Site-specific closure objectives consistent with those land use(s), that are realistic and achievable" and "Conceptual landform design diagram(s)". Section 5.1 - Post-Mining Land Use - proposes that the final land uses will be a combination of: future mining resource area; rehabilitated 'modified landscapes'; tourist attractions consistent with the mining heritage of the Goldfields Region; and, zones with restricted access for safety. Section 5.1.1 Table 5 provides site specific proposals for final land uses and is a reasonable start but is a summary only. As well, the table doesn't have objectives	KCGM met with DMIRS Geological Survey section and DPLH Land Use Planning (including the Planning and Contaminated Sites sections) in November 2019 to discuss post mining final land use for KCGM. Outcomes of this meeting are discussed in context to post mining land use in Section 6.1. Further stakeholder engagement strategies are discussed in Section 4.2.

Section of MCP	DMIRS Comments	KCGM Response
	for each proposed land use and there are no conceptual landform design diagrams. The Plans notes that "Consultation with key stakeholders to develop and define the post mining land use options is ongoing. Environmental, social and economic assessments will be undertaken to ensure the selected land use options are consistent with regulatory constraints and are sustainable into the future." In short, the post-mining land use are yet to be agreed with key stakeholders including regulators. However, the Consultation plan in Section 4.2 does not refer to community and stakeholder engagement regarding the final land uses and objectives. *Comments: It is reasonable that the final post-mining land uses, and relevant objectives have yet to be agreed to given the size of the project and the complexity of the related issues.* ***Recommendation**: Getting agreement on the final post-mining land uses is a significant issue and a clear consultation/engagement strategy should be described in the Plan, including a proposed timetable for reaching agreement on final land uses, relevant objectives and conceptual landform design diagrams, and the key stakeholders to be consulted, including community groups.*	
Section 5: Post Mining Land Use and Closure Objectives	The super pit is a significant tourist attraction within the Goldfields and includes a look-out and tours, with many community members wanting these to remain in place to attract tourists to the region. This would generate a number of unique management issues relating to public access to a mining pit. ***Recommendation:** KCGM need to firmly establish a closure strategy for the pit and likely post mining land use/ management with public safety a priority.*	Due to long term monitoring and maintenance concerns related to public liability, KCGM will close the visitor look out at the end of mining operations. Please note, there is no direct access from the visitor's lookout to the open pit.
Section 6: Development of Closure Criteria	The Guidelines require that the Plan have Completion Criteria that will be used to measure rehabilitation success, demonstrate the closure objectives have been met, and be developed for each domain which consider environmental values. The criteria should be specific, measurable, achievable, relevant and time-bound. ***Recommendation:** KCGM should revise some of the objectives, closure criteria and measurement tools to better reflect the requirements of the Guidelines, as described below.*	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8. See Volume 1 Chapter 6 and 8.
Section 6: Development of Closure Criteria	**1. Key stakeholders.** The existing objective is "KCGM's key stakeholders will be consulted in relation to post closure outcomes." The objective is a process objective rather than being outcome based, i.e. to meet this objective KCGM would only have to carry out a consultation process with no requirement to consider the submissions and views received during the process. The existing closure criteria is	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8.

Section of MCP	DMIRS Comments	KCGM Response
	"Key stakeholders provided with opportunity for input on closure, as set out in a Stakeholder Engagement Strategy." As with the Objective, this criterion is about process rather than outcomes. ***Recommendation:*** *The objective and closure criterion should specify what the desired outcome of the process should be. A suggested amendment to the existing objective is "… and that any statutory requirements are met, any additional expectations and requests fully considered, and met where appropriate."* The second measurement tool is open-ended – "Stakeholder input will be incorporated into the Mine Closure Plan (MCP)". This suggests all input will be incorporated into the MCP, which is unlikely to be the case and would likely create unrealistic community expectations. ***Recommendation:*** *This measurement tool should be reworded to be consistent with a revised objective to avoid creating unrealistic community expectations.* It is noted that a measurement tool is completion of the SIA Community Survey or research. Whilst the Plan describes the SIA work done to date in sections 4.1.2.4 and 4.4.2, it is unclear what the purpose of having this survey/research as part of closure criteria is. If it is to assess the social impacts of the mine closure, does KCGM intend to address and plan for any significant impacts, for example potential impacts on local business and employment? *Comments: The local impacts of the mine closure, both economically and socially could be significant. It is acknowledged that this issue is beyond the requirements of the Guidelines but the existing Plan makes reference to this work. KCGM should provide some clarify about what is the purpose of the SIA work and who would be responsible for addressing the identified potential impacts.*	Section 10 Monitoring and Maintenance has also been significantly amended to include further detail on measurement tools for each criteria. Section 4 has been reviewed and rewritten to include further information on initiatives that arose from the 2015 SIA.
Section 6: Development of Closure Criteria	**3. Infrastructure and Heritage Features.** The first two measurement tools are actions not outcome based, as is the last measurement tool related to vegetation. ***Recommendation:*** *The first two measurement tools should be modified to be a single specific outcome focused measurement tool, for example "Post demolition inspections show that infrastructure and heritage features that have been identified for retention have been protected". The last measure tool could be similarly amended.*	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8. Section 10 Monitoring and Maintenance has also been significantly amended to include further detail on measurement tools for each criteria.
Section 6: Development of Closure Criteria	**4. Landforms.** The first objective is reasonable, as it is outcomes focused, but the closure criteria and measurement tools would not ensure the objective is met. The measurement tool only requires that the water management features meet design	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow

Section of MCP	DMIRS Comments	KCGM Response
	specifications rather than the surface water flows being consistent with regional drainage. ***Recommendation:*** *The closure criteria and measure tool should be changed to be related to measurement of post closure surface water flows and whether they are consistent with regional drainage.* The completion criterion "WRD and TSF designs will have appropriate geotechnical and design criteria" and a broad closure strategy for tailing storage facilities has been provided in section 9.3.4, but a detailed closure strategy, supported by geotechnical studies and/or modelling has not yet been developed. ***Recommendation:*** *Future Plan submissions will need to develop this criterion to ensure it meets the S.M.A.R.T. principles (specific, measurable, achievable, relevant and time-bound).*	KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8. Section 10 Monitoring and Maintenance has also been significantly amended to include further detail on measurement tools for each criteria.
Section 6: Development of Closure Criteria	**Impact on local environment:** The first measurement tool related to tracking Black Flag Shale stockpile. ***Recommendation:*** *Further detail about the capping of the Black Flag Shale stockpile will be required in future MCP submissions, to ensure that potentially acid forming material is adequately managed to achieve closure objectives of safe, stable and non-polluting.*	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8. Section 10 Monitoring and Maintenance has also been significantly amended to include further detail on measurement tools for each criteria.
Section 6: Development of Closure Criteria	**Rehabilitation:** The closure criteria are adequate for this version of the Plan, but will need further refinement for the next version of the plan. ***Recommendation:*** *The closure criteria must be updated and refined prior to the next MCP submission. The completion criteria will need to be refined in future revisions to ensure that they are:* • *Specific enough to reflect a unique set of environmental, climatic, social and economic circumstances;* • *Flexible enough to adapt to changing circumstances without compromising objectives;* • *Suitable for demonstrating rehabilitation trends of environmental indicators;* • *Acceptable to key stakeholders;* • *Measure, achievable and objective;* • *Based on targeted research/science/trials; and* • *Refined during operations continuous improvement.*	In 2019 discussions were held with the EPA regarding KCGM's previous Closure Objectives which were embedded in existing approval documents. The EPA agreed to allow KCGM to make changes to these objectives, in the spirit of adaptive management. See Volume 1 Chapter 6 and 8. Section 10 Monitoring and Maintenance has also been significantly amended to include further detail on measurement tools for each criteria.

Section of MCP	DMIRS Comments	KCGM Response
	Overall comment: As discussed below, there is some mis-matches between the Completion Criteria and the data collected and reported in the Plan that need to be addressed.	
Chapter 7: Collection and analysis of closure data	The Guidelines require that the MCP collect and report data relevant to closure baseline data to: • Provide a basis to develop criteria or indicators for closure monitoring and performance (above); • Establish achievable closure outcomes and goals in a local and regional context; • Establish baseline conditions for closure monitoring programs, including the identification of reference sites; and • Identify the issues to be managed through the mine closure process. Chapter 7 contains a substantial amount of information, only some of which is relevant to closure baseline data and criteria or indicators for closure monitoring and performance. ***Recommendation:*** *Chapter 7 should be re-structured to make it clear which information is related to closure baseline data and which information is not, or, the information not related to closure baseline data be removed.* As well, the information that is relevant to the closure baseline data and criteria (completion criteria) need to be reviewed and a direct and clear link made to the closure criteria. For example, the existing objective for surface water hydrology is "Surface water (flow) will be managed to be consistent with regional drainage." The focus of the relevant section in chapter 7 is 7.1.5 is solely on Hannan Lake. This may be reasonable, and if so, monitoring the hydrology should be the focus of the closure criteria and measurement tool as the key indicator that the overall objective is being met. ***Recommendation:*** *The information contained in Chapter 7 and the Completion Criteria should be reviewed to ensure the data being collected properly inform, and are related to, closure criteria and measurement tools. As well, the proposed monitoring must be clearly linked to detailed completion criteria (see Chapter 10 comments).* Section 7.4 of the Plan provides a summary of the 125 potentially contaminated sites identified at the operation. This section has been updated since the previous Plan as a result of a 2017 'Contaminated Sites Review' and now includes a risk assessment to prioritise remediation of these sites and outline proposed	Volume 1, Section 5 Collection and Analysis of Closure Data has been reviewed and edited to provide further context for closure and rehabilitation. Given the large and complex nature of the site, KCGM's intent when providing additional information is to provide context for the reader/assessor to better understand the site. Removal of too much of this information, we feel, would be detrimental to the overall understanding of the closure strategy. Section 10 Monitoring and Maintenance has also been significantly amended to include further detail on measurement tools for each criteria. Further work has been completed on several Contaminated Sites presented within Section 5.4 and the summary table has been updated accordingly.

Section of MCP	DMIRS Comments	KCGM Response
	management strategies. This discuss is adequate for this version of the Plan, but will need further refinement for the next version of the Plan. ***Recommendation:*** *The next Plan iteration should include an update on the implementation of these management strategies.*	
Chapter 10. Closure Monitoring and Maintenance	A key requirement of the Guidelines is that the proposed monitoring should address the Completion Criteria. As noted above, the Completion Criteria section of the Plan does not adequately relate to other key sections, including Chapter 10. The key mis-matches are: • The Plan notes that groundwater will be monitored but this is not included in the Completion Criteria; • Rehabilitation monitoring in the Plan is about flora but there is no mention of fauna monitoring; • There is no proposed monitoring of the following – Stakeholder engagement, public safety of the pits and voids, infrastructure works and protection of vegetation of Aboriginal heritage. ***Recommendation:*** *The proposed monitoring should be reviewed and amended to ensure that appropriate data is collected for all completion criteria. The proposed monitoring must be clearly linked to detailed completion criteria and should include interim targets, and thresholds for when investigations and/or maintenance activities are required. More detail should also be provided regarding contingency actions that will be undertaken if thresholds and/or completion criteria are not being met.*	Section 10 Monitoring and Maintenance has also been significantly amended to include further detail on measurement tools for each criteria.

13.3 Knowledge Gaps

The current and previous knowledge gaps identified by KCGM are outlined in Table 13-4. Significant work has been conducted and is ongoing to close out identified knowledge gaps in closure planning at KCGM. Knowledge gaps have been addressed through review of the information presented in Section 7 and outcomes of completed closure studies and consideration of closure risks in each Domain in Section 9. These, together with knowledge gained from completed progressive rehabilitation, continue to inform further studies. The KCGM strategy for scheduling closure studies is focused on prioritising closure risks that can be influenced by operational activities. For example; landforms that are being actively constructed, where operational practices could have a significant impact on closure, have been prioritised.

Studies and projects that have been initiated, completed or are ongoing include:

- Ensuring adequate closure provisioning based on international auditing standards;
- Geochemical and physical characterisation of waste materials;
- A waste characterisation classification for materials that have been stockpiled over the life of mine for use in rehabilitation;
- Using materials characterisation, development of suitable closure designs for Fimiston WRDs and TSFs;
- Development of closure designs for Gidji TSFs;
- Hydrological and hydrogeological investigations to determine the response of aquifers and local surface water flows post closure; and
- Trials to determine practical reclamation and rehabilitation implementation prescriptions and methods (Vol 1 Section 5.5).

13.3.1 Summary of Knowledge Gaps Studies

Table 13-4: Closure Planning Knowledge Gaps

Knowledge Gap	First Identified	Status	Projects and Outcomes	Addressed Within Section
Open Pit Abandonment Strategy: Robust and defensible closure strategies for abandonment for all open pit features	2010	Ongoing KCGM will continue to progress this project, in alignment with future operational and growth planning. Planned work is aligned with operational planning of future pit shells. Items requiring further investigation are abandonment requirements and stand-off distances for new pit shell.	Pit abandonment features at KCGM cannot necessarily follow the standard approach, and require further consideration, due to the limited space available, proximity of the community and infrastructure as well as future mine planning. ***Fimiston Open Pit*** KCGM has previously conducted considerable investigations into site specific pit wall stability, to comply with the risk-based requirements of the DMIRS (safety) pit abandonment requirements. This work, as well as two peer reviews, was presented and approved in the Fimiston Gold Mine Operations Extension (Stage 3) and Mine Closure Planning (2007) and the Mining Proposal Resubmission Fimiston Gold Mine Operations Extension (Stage 3) – Golden Pike Cutback and Northern Waste Landform, 2009. In 2016, independent reviewer Dr Phil Dight was engaged to provide a review of the original geotechnical assessment of Golden Pike and the associated abandonment bund placement (2005 report 'Geotechnical Assessment of Golden Pike Cutback') to determine if the original geotechnical assumptions had been validated during the mining phase of the Golden Pike cutback. The relevant points regarding rockmass behaviour, oxide profile depth and geological structural setting have been proven correct, with good overall wall stability observed in Golden Pike. In preparation for the Fimiston South cutbacks, extensive geotechnical work and modelling has been undertaken. With new understandings from back analysis of the 2018 failure and other controls, verification work is planned for the Golden Pike wall. ***Mt Charlotte Open Pit*** Mt Charlotte Operational Area will be assessed for further geotechnical study requirements, with respect to buttressing. Underground void management is well understood and managed. . Buttressing designs and associated Zone of Instability were reviewed and amended during this closure planning period. ***Mt Percy Open Pits*** Mt Percy Operational Area will be assessed for further geotechnical study requirements, with respect to buttressing. Buttressing designs and associated Zone of Instability were reviewed and amended during this closure planning period.	Vol 2, Section 9.2.2.3.2 Vol 2,Section 9.3.1 Vol 2, Section 9.5.1

Knowledge Gap	First Identified	Status	Projects and Outcomes	Addressed Within Section
Progressive development and refinement of implementation strategies for closure of each TSF.	2010	On holder until data collection is adequate	***Fimiston TSFs*** TSF closure designs for the Fimiston TSFs have been progressed, with the following key tasks completed: • Situational review: At the beginning of the project, a review of all approvals, constraints and limitations and TSF status was completed. This information was used to inform decisions in the project. • Refinement of geotechnical criteria: A closure based geotechnical review of the TSFs and formulation of design criteria for the TSFs was undertaken by certified geotechnical engineers. • TSF Closure Design: Design criteria for the three operational paddock TSFs at Fimiston has been completed. The Fimiston TSFs are fundamentally similar in design, with learnings from the WRD erosion resistant design used for the TSF outer capping design. Consideration of practical operational limitations were considered in the development of closure designs, for example proximity of permanent non-KCGM infrastructure to the TSF. • Optimise costs: This aspect is ongoing during annual closure provisioning. • Ensure TSF designs align with regulatory requirements and community expectations: The outcomes of the project have been presented to the Community Reference Group in 2017. KCGM submitted and received approval for a TSF Closure Mining Proposal from DMIRS in 2018. • Cover Material Haulage Availability: Suitable benign waste rock has been stockpiled at the Eastern WRD for usage as capping material. This is the outcome of internal stakeholder consultation. • Increase awareness of closure requirements and implications during operational decision making: Workshops and briefing sessions have been held to ensure that stakeholder input has been incorporated into the design and planning in this project. *This Closure Planning Period: No further work is required at this point, and the project can be considered closed.* ***Gidji TSFs***	Vol 2, Section 0 Vol 2, Section 9.4.2

Knowledge Gap	First Identified	Status	Projects and Outcomes	Addressed Within Section
			A conceptual water shedding closure design for Gidji TSFs was presented in the approved Gidji TSF Extension Mining Proposal (Gidji II Mining Proposal). *This Closure Planning Period: A complete review of the closure design was undertaken, with a significant change in closure design resulting. Further water balance work over the next 2 closure planning periods will be required to allow for the next level of detailed design work to occur.* ***Mt Percy TSF*** The Mt Percy TSF has been rehabilitated using oxide material, with the upper surface presently covered. Rehabilitation of the Mt Percy Operational Area was completed in the early 2000s, and the site is currently in a monitoring phase. *This Closure Planning Period: no work was undertaken for this Domain*	Vol 2, Section 9.5.3
Confirmation of status, planned works and legal liability for Contaminated Sites.	2012	Ongoing	A large project was completed to review data and information and develop a risk based strategy for progressing Contaminated Sites work before the 2018 MCP. KCGM intends to liaise with the DWER to confirm the status of all reported sites. Several legacy/historic sites were reported to the DWER for which KCGM may not be liable for investigation and remediation. KCGM intends to obtain legal advice in order to clarify liability surrounding these sites before any further works are completed. Review of data and further information gathering for reported Contaminated Sites is ongoing, with the aim of developing Preliminary Site Investigations for targeted areas. As such, several sites underwent PSI in 2020. For some other sites, groundwater data collection will be ongoing, before further studies can be progressed. *This Closure Planning Period: Contaminated sites investigations were undertaken at a number of sites; the Summary document was updated to reflect new knowledge.*	Vol 1, Section 5.4
Development/refinement and agreement with stakeholders for post mining land use.	2010	Closed	In previous MCPs, KCGM has provided draft future land use. *This Closure Planning Period: In 2019, after discussions with the EPA, KCGM met with key Regulatory stakeholders to discuss Final Land Use. New Closure Objectives and Completion were developed for MCP2021.*	Vol 1,4.3, 6 & 8
Development of refined closure criteria			Both the EPA and the DMIRS require measurable completion criteria in the MCP, to define closure success. Developing SMART closure criteria has proven challenging. Initial development of completion criteria was undertaken for the Golden Pike PER and also through a stakeholder workshop with representatives of KCGM, Barrick, Newmont, and key external consultants (2009). A review of Closure Aspects and Objectives in 2014 allowed for greater refinement of completion criteria. Feedback received from regulators	Vol 1,Sections 4.3, 6 & 8 Vol 2, Sections 9 & 10

Knowledge Gap	First Identified	Status	Projects and Outcomes	Addressed Within Section
			on the 2018 submission indicated that significant further work was required before these criteria would be considered adequate for approval. For a company to make informed decisions when defining achievable and realistic completion criteria, considerable scientific studies to provide information and understanding of each aspect is required. As such, several studies were conducted to assist with refining the completion criteria further, with some outcomes provided in this submission of the MCP. This project includes the following major deliverables: • Further work on criteria for Open Pits, taking into account potential changes to the pit shell; • Further development of draft closure criteria for groundwater criteria associated with active TSFs; • Further development of draft vegetative criteria *This Closure Planning Period: The schedule for this work is provided in Vol 2, Section 13.3.2. The schedule is now closed out, with most work completed, and outstanding items have been incorporated into the Tasks and Studies in Section 9.7.*	Vol 2, Section 13.3.2 Vol 2, Section 9.7
Development of a holistic rehabilitation assessment methodology for assessment of attainment of closure criteria.	2012	Ongoing	From 2012 KCGM has investigated and developed a project for improving vegetation and erosion assessment, with the objective to develop a methodology that provides clearer linkage to completion criteria in alignment with the EPA Guidance Statement No. 6 (Guidance for the Assessment of Environmental Factors Rehabilitation of Terrestrial Ecosystems). Initial project work focused on an assessment of data and reporting quality using past monitoring methodologies. Guidance was also given for possible rehabilitation monitoring methods that could be used in lieu of previously used methods, which have been successfully implemented on other Goldfields sites. Given that rehabilitated landforms are vastly different in terms of structure and geological age to natural landforms, previously developed monitoring methods favour measurement and comparison of rehabilitation against natural analogue communities. Unfortunately, finding comparable analogues within the natural landscape is not possible for the engineered constructed mine landforms as there is no similar landscape in terms of geological age, topography, and soil structure in the surrounding landscape. In order to overcome this, only vegetation was compared, and the topography was ignored. A separate monitoring method would be used for erosion assessment. A recommended method for vegetation monitoring was field trialed in Spring 2014, with two rehabilitation areas compared against a group of sites in local vegetation	

Knowledge Gap	First Identified	Status	Projects and Outcomes	Addressed Within Section
			communities. Vegetation was reported as generally comparable to local vegetation communities on average. In 2017, progressed trialing vegetation monitoring and consideration of measurement tools for evidencing progression towards completion criteria. New rehabilitation has been monitored in 2017, with detailed results not available as of submission of this MCP. Preliminary results indicate that vegetation is performing well; it is representative of local vegetation and vegetation establishment has increased substantially between 2015 - 2017 years. During 2017 a flora and vegetation data consolidation project was commenced to provide a consolidated data set for the KCGM footprint, which will assist in understanding of local vegetation. A project is underway to understand the impacts of salinity, sodicity and other parameters on the emergence of revegetation. KCGM is moving to a more holistic view of monitoring. Monitoring commences with the quality assurance (QA) of rehabilitation activities against design. In general, the sequence of monitoring is: • Quality assurance against design intent; • Salinity, and change of salinity over time, as rainfall leaches salts; • Erosion observations; • Later, vegetation monitoring, in a format that has better alignment with the completion criteria and at frequencies that are appropriate for the rainfall/vegetation patterns of the Goldfields. KCGM is trialing implementation of these activities as well as further studies to close information gaps should they become evident. Previous vegetation monitoring work was based on alignment with the EPA Guidance Statement No. 6 (Guidance for the Assessment of Environmental Factors Rehabilitation of Terrestrial Ecosystems). As this Guidance Statement will be revised in the near future, the foundation of the project may need to be reviewed when a new guidance statement is released. *This Closure Planning Period: Field and desk top studies were undertaken to develop Completion Criteria and Monitoring Methods for vegetation.* *Next Closure Planning Period: Further work is required to trial the methods and add a fauna component.*	Vol 2, Section 10

Knowledge Gap	First Identified	Status	Projects and Outcomes	Addressed Within Section
Rates of draindown and residual seepage in closure from the Fimiston TSFs	2012	Closed until closer to end of LOM	An investigation into rates of draindown and residual seepage in closure was undertaken in 2014 (Golder, 2014) using numerical cross section models. Draindown and long term groundwater elevation post deposition as well as in recharge response to large precipitation events were investigated and defined (BDH, 2016). The model results identified that TSF drain down would be achieved within two years, and that long term ongoing seepage rates to the groundwater system underlying the whole of each tailings deposition cell would be in the range 2 to 5 L/s. The locations and potential magnitudes of changes in groundwater elevation which will occur during closure in response to recharge from large precipitation events have been investigated and defined (BDH, 2016); the rise in groundwater levels associated with AEP 3% precipitation events which have occurred during operations was a maximum of 2 to 3 m within the Fimiston floodway, reducing to around 0.5 m near the Fimiston and Kaltails TSFs. It has also been noted that there are locations where groundwater has naturally been shallower than the current limits set for vegetation protection, and that this would require consideration when setting closure criteria for groundwater elevations. The estimated durations and rates of seepage and groundwater recovery during closure for each facility that have been applied in the closure plan are considered to be conservative (to over-estimate pumping requirements) based on comparison with the observed behaviour of the Kaltails TSF during the temporary decommissioning period from 2000 to 2011, and the observed behaviour of the Fimiston I TSF during the temporary decommissioning period from 2013 to 2019. Further refinement of these aspects will be considered prior to closure, once the operational tailings deposition schedule has been finalised. Once operational tailings deposition schedules have been finalised, and all facilities have been operated for a sufficient period to identify any operational seepage influences, detailed closure criteria for groundwater depths will be generated following the methodology described in the preceding section and presented for stakeholder review. Abstracted TSF seepage will be pumped to and disposed of within the Fimiston Open Pit during closure and these volumes have taken into account during modelling of pit lake formation post closure. *This Closure Planning Period: Draft groundwater closure criteria have been developed, and can be found in App5-7 and Section 10 (Vol 2). This will be reviewed closer to end of the operational period.*	Vol 1, Section 5.1.5 Vol 2, Section 10.3.3 Vol 3, App 5-7

Knowledge Gap	First Identified	Status	Projects and Outcomes	Addressed Within Section
Chemistry of surface water run off from Fimiston Operations	2012	Ongoing	Baseline data has been collected to date during runoff events to characterise any impacts to the surrounding surface water regime. There has been no continuous flow in the Fimiston Floodway since 2014. Data collection will continue to be actioned when large rainfall events occur and runoff is observed in the Fimiston Floodway, surrounding surface water bodies and from Operational Areas. *This Closure Planning Period: most of the period was too dry for and runoff. Fimiston Floodway partially flowed during a 1:10 event in February 2021, with samples taken.*	Vol 1, Section 5.1.6
Physical characteristics of the post closure pit lake within the Fimiston Pit	2012	Closed until closer to end of LOM or material change occurs	A pit lake GoldSim model completed in 2014/15 for Fimiston Pit. The outcome was that the pit lake is a groundwater sink, and will reach a height of approximately halfway up the pit, with no overtopping. The model included accounting for the addition of residual groundwater from long term seepage being disposed in Fimiston Pit. In 2020 an updated closure site wide water balance was constructed which incorporated modelling of pit lake development in the Fimiston Open Pit. The quantification of inflows and outflows in the water balance model was then used for hydrochemical modelling of the pit lake (MBS Environmental & GRM, 2020). The updated models take account of all facilities planned to be constructed under the current mine plan, and account for all geochemical influences on pit lake chemistry, including: seepage recovery pumped from the TSFs after the plant is decommissioned, the influence of backfill placed into the Fimiston Open Pit, and the influence of discharge from the Mt Charlotte Underground Mine. The modelling work provides the most accurate estimates of filling time, final lake elevation, and evolution of chemistry of the lake in the Fimiston Open Pit which can be achieved during the operating period. *This Closure Planning Period: The pit lake model was updated to reflect the proposed Fimiston South cutbacks (Mining Proposal and S45c approval). The model will be updated as there are material changes such as change in pit shell or close to end of LOM.*	Vol 1, Section 5.3.2.1.1 Vol 2, Section 9.2.2.3 Vol 3, App 5-2
Chemistry of surface water runoff from Fimiston Operations	2012	Ongoing	Baseline data has been collected to date during runoff events to characterise any impacts to the surrounding surface water regime. There has been no continuous flow in the Fimiston Floodway since 2014. Data collection will continue to be actioned when large rainfall events occur and runoff is observed in the Fimiston Floodway, surrounding surface water bodies and from Operational Areas.	Vol 1, Section 5.1.6

Knowledge Gap	First Identified	Status	Projects and Outcomes	Addressed Within Section
			This Closure Planning Period: 1 event in February 2021 with samples taken	
Closure strategy to ensure geotechnical stability of historic voids and the Glory Hold Pit within Mt Charlotte underground mine.	2010	On hold until 2025	Backfilling of the majority of Mt Charlotte underground historical workings is planned to be completed during operations. The schedule is reviewed annually as part of operational / closure liaison.	Vol 1, section 5.3.4.1.4
Development of a Waste Dump Planning Strategy	2010	Closed (2015) Area specific ongoing implementation level design adjustment will continue.	Due to operational/closure opportunities, there was a focus on refining WRD closure planning for Fimiston from 2012 - 2015. This included: • Progressive rehabilitation performance review; • Review and refine closure waste dump design; • Development and implementation of the visual amenity concept; • Erodibility studies of available KCGM rehabilitation materials; • Review of Material Classification System; and • Integration of closure works into mining operations and increase site awareness of closure requirements.	Vol 1, Section 5.3.2.2 Vol 2, Section 9.2.3
Development, refinement and approval of the Visual Amenity Concept	2012	Closed	Approval for the Visual Amenity concept for the WRDs has been formalised in an approved Mining Proposal (2017), closing out this phase of the project. The Visual Amenity zone boundaries have also been tied to actual WRD lift boundaries, allowing for practical application and implementation of the Concept. Rehabilitation activities have been planned, costed and implemented within this framework.	Vol 2, Section 9.2.3
Update rehabilitation materials classification	2010	Closed (2015)	Rehabilitation Materials were reclassified under the revised system, to yield a rehabilitation materials balance, which in turn allowed KCGM to review actual vs needed volumes of rehabilitation materials. KCGM is using this, together with the Visual Amenity concept, to identify and prioritise areas to receive rehabilitation materials.	Vol 1, Section 5.1.4
Condition of vegetation associated with Aboriginal Heritage Sites	2012	Closed (2015)	Study completed in 2013 to assess health of vegetation. DAA letter to say they consider the matter closed. Knowledge gap considered closed.	Vol 3, App 4-2
Rate and timeframes for post closure flooding of the Mt Charlotte underground mine	2012	Closed (2015)	2014 groundwater modelling study completed for Mt Charlotte underground. If there was a substantial change to underground void volume or amount of seepage entering Mt Charlotte, a new study could be initiated.	Vol 1, Vol 3, App 5-9

Knowledge Gap	First Identified	Status	Projects and Outcomes	Addressed Within Section
Strategy for (including specific costing) demolition of KCGM infrastructure	2012	Closed (2015) Study will be reopened closer to end of operations	An updated Demolition Plan was completed in 2014 for fixed plant and infrastructure as a combined effort between environmental and engineering staff. The Plan provides costings and a method statement, as a basis for closure provisioning. During the period 2015-2018, some demolition activities were brought forward in LOM, such as demolition of the Gidji Roasters. Demolition of the Gidji stack was strongly considered, but the risk to existing infrastructure was too high for the project to proceed.	Vol 2, Section 11

13.3.2 Land Use and Completion Criteria Knowledge Gap

Most of the actions in this study programme were successfully completed, despite delays and difficulties associated with Covid-19. The few remaining outstanding actions or actions with long timeframes have been incorporated into the Task and Study Schedules and will continue to be progressed. KCGM considers the work in this programme to be complete or scheduled elsewhere, with this schedule closed out.

Table 13-5: Land Use and Completion Criteria Knowledge Gap Study Schedule for MCP 2021 with Indicative Timeframes and Outcomes

Land Use	Operational Area	Feature	Task	2019	2020				2021				2022			Status
				Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	
Develop Closure Land Use v2	**All**	**All**														
Develop Closure Land Use v2			**Engage with key Regulatory Stakeholders**	completed												
			Document Provisional Land Use in MCP 2018 Resubmission (these may be revised as further study information becomes available)	completed												

Completion Criteria	Operational Area	Feature	Task for developing v2 of Completion Criteria and Monitoring Tools	2019	2020				2021				2022			Status
			Calendar year	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	
Develop v2 of Completion Criteria			**Revise Completion Criteria and associated monitoring and measurement tools for MCP2021**													Reviewed & revised version in MCP
Key Stakeholders	**All**	**All**	**Implement updated Stakeholder Engagement strategy**													
			- Implement Local Voices to engage with all stakeholders													Ongoing, and reported in Stakeholder Engagement section
			- Engage with key Regulatory stakeholders													
Public Safety - Inadvertent access	**Fimiston Mt Charlotte Mt Percy**	**Open Pit**	**Inadvertent public access to Open Pits will be prevented as far as practicable; and Open Pit wall stability will not impact on public infrastructure**													
			Develop Open Pit Abandonment Strategy v1													Reviewed & revised outcomes in MCP
			- Options analysis for abandonment feature													Reviewed & revised outcomes in MCP
Public Safety - Stability	**Fimiston Mt Charlotte Mt Percy**	**Open Pit**	**Inadvertent public access to Open Pits will be prevented as far as practicable; and Open Pit wall stability will not impact on public infrastructure**													
	Fimiston		**Develop Open Pit Abandonment Strategy v1**													
			- Pit wall oxide studies		Completed											
			- Pit wall geotechnical studies		Completed for Fimiston South											Further work required; Actions embedded in MCP2021/2022 - moved Closure Tasks Table
			- Setback assessment		Completed											
			- Liaison with City KB Planning and DHLP Land Use Planning		Completed											
			- Pit Lake model update			Completed								Completed		
	Mt Percy		- Pit Lake assessment			Completed								Completed		
Public Safety	**Mt Charlotte & Sam Pearce decline**	**Underground openings**	**Inadvertent public access to shafts or decline created by KCGM will be prevented as far as practicable**													Engineered portal seals committed to in closure prescription
			- Update shaft sealing designs													Update of shaft sealing designs moved Closure Tasks Table
Infrastructure	**All**		**Infrastructure will be demolished and removed**													
			- Update Demolition Plan				Not completed; will be actioned 2025									Will be done later in LOM - moved to Closure Task table
Heritage Features			**Indigenous heritage features will be identified and left undisturbed by Mining activities**													Legislation change & new Cultural Heritage Management Plan developed
			- Continue to use KCGM internal land disturbance approval system for closure works; no further action required													Ongoing

Completion Criteria	Operational Area	Feature	Task for developing v2 of Completion Criteria and Monitoring Tools	2019	2020				2021				2022			Status
			Calendar year	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	
Landforms - Surface water; Stability	Fimiston		- No further action required for designs - Fimiston WRD and TSF designs have been completed - Trial inspection / verification of landform design implementation to identify process gaps													Not actioned yet; covid delay
	Mt Charlotte		- No landforms present													
	Mt Percy		- No immediate action required - Landforms have been rehabilitated in early 2000s													
	Gidji	TSF	- Develop option analyses for Gidji TSF				Completed									Action completed earlier than planned; further work required - embedded in MCP2021/ 2022 - moved Closure Tasks Table
	Regional															No immediate action required
		WRD	- Trial inspection of verification of landform design implementation to identify process gaps													moved Closure Tasks Table
Impact on Local Environment - Geochemistry			**Landforms (WRDs and TSFs) designed to minimise impacts to the quality of the environment away from the immediate footprint**													Considered in design work; no immediate action required; Well managed
Impact on Local Environment - Groundwater			**Groundwater seepage from TSF landforms does to not exceed the assimilative capacity of the receiving environment.**													No immediate concerned
	Fimiston	TSFs	- Develop proposed implementable closure groundwater criteria			Completed										Further work identifed that Seepage & Groundwater Management Plans are most appropriate post closure management tool
	Mt Percy															No action required - Bores around TSF dry ; licence closed out before 2000
	Gidji	TSF	- Update groundwater model					Partial								Partially completed (review of old model completed; moved to closure Task table
Impact on Local Environment - Contaminated Sites			**Land contamination managed in compliance with Contaminated Sites Act 2003**													
			- Continue with targetted studies and investigations			Several sites investigated										Work delayed due to Covid-19
Rehabilitation - Vegetation completion criteria			**Rehabilitate previously disturbed areas to a modified landscape considering visual amenity and rehabilitation materials used.**													
			- Investigate relationship between soil properties and vegetation to simplify completion criteria; check alignment with planned material placement ie visual amenity strategy			investigation completed										Statistical relationships between soil properties and vegetation growth & denisity; Paper presented at GEMG conference with findings; next phase, this will be intergrated into Completion Criteria
			- Develop realistic, implementatable revegetation criteria			1st version completed										Documented in MCP 2021/ 2022
			- Field test v2 criteria on rehabilitated areas			Delayed by Covid-19										
			- Refine and field test proposed monitoring technique for revegetation			Delayed by Covid-19										New draft completion criteria presented in MCP2021; Work delayed and impacted by Covid-19; Added to MCP Task table; Further work planned in 2022/23
Rehabilitation - Fauna			**Areas designated for revegetation will provide an appropriate habitat for native fauna consistent with post closure land use.**													
			- Develop monitoring observation sheet		Not completed											Work delayed and impacted by Covid-19; Added to MCP Task table; Will be progressed in 2022/23
Closure Planning																
			- Continue with current processes, studies and implementation													

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15. ABBREVIATIONS AND ACRONYMS

ACRONYM	DEFINITION
AHS	Aboriginal Heritage Sites
AMD	Acid and Metalliferous Drainage
AMPHOF	Australian Mining and Prospecting Hall of Fame
ARI	Average Recurrence Interval
Black Flag Beds	Also referred to as Black Flag Shales or simply as Black Flag
BRCE	Barrick Reclamation Cost Estimator
C&M	Care and Maintenance
CASA	Civil Aviation Safety Authority
CIL	Carbon in Leach
CIP	Carbon in Pulp
CKB	City of Kalgoorlie-Boulder
CME	Chamber of Minerals and Energy
CMP	Care and Maintenance Plan
CN	Cyanide
CRG	Community Reference Group
CS Act	Contaminated Sites Act (2003)
DAA	Department of Aboriginal Affairs
DEC	Department of Environment and Conservation
DER	Department of Environment Regulation
DWER	Department of Water and Environmental Regulation
DMIRS	Department of Mines, Industry Regulation and Safety
DMP	Department of Mines and Petroleum
DoIR	Department of Industry and Resources
DOW	Department of Water
DoW	Department of Water
DPAW	Department of Parks and Wildlife
DoP	Department of Planning
EC	Electrical Conductivity
EFA	Ecosystem Function Analysis
EMP	Emergency Management Plan
EMS	Environmental Management System
EPA	Environmental Protection Authority
EPBC	Environmental Protection and Biodiversity Conservation
ESP	Exchangeable Sodium Percentage
FOS	Factor of Safety

ACRONYM	DEFINITION
g/t	grams per tonne
GEDC	Goldfields Esperance Development Commission
GGAS	Geomorphic Gully Assessment System
GM	General Manager
ha	hectare
HDPE	high density polyethylene
JV	Joint Venture
KCGM	Kalgoorlie Consolidated Gold Mines
kL	thousand litres
KLV	Kalgoorlie Lake View
km	kilometres
LFA	Landscape Function Analysis
LGA	Local Government Area
LOM	Life of Mine
m^3	cubic metres
mAHD	metres above Australian Height Datum
mbgl	metres below ground level
MCP	Mine Closure Plan
MCP	metres
mg/L	milligrams per litre
ML	million litres
MP	Mining Proposal
Mtpa	million tonnes per annum
NAF	Non Acid Forming
NKMPL	North Kalgurli Mines Pty Ltd
NOI	Notice of Intent
OEPA	Office of the Environmental Protection Authority
OLS	Obstacle Limiting Surface
PAF	Potentially Acid Forming
PER	Public Environmental Review
PIL	Public Interaction Line
ROM	Run of Mine
SAG	Semi Autogenous Grinding
SIA	Social Impact Assessment
SLT	Senior Leadership Team
SURF	Stoping Under Rockfill
TDS	Total Dissolved Solids

ACRONYM	DEFINITION
TSF	Tailings Storage Facility
UFG	Ultra Fine Grind
µS/cm	microSiemens per centimetre
WAD CN	Weak Acid Dissociable Cyanide
WAPC	Western Australian Planning Commission
WASM	Western Australian School of Mines
WAWA	Western Australia Water Authority
WRD	Waste Rock Dump
ZOI	Zone of Instability