APPENDIX G

Final Rehabilitation, Decommissioning and Mine Closure Plan Including Environmental Risk Assesement

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DMR REFERENCE NUMBER: NC 30/5/1/2/2/10166MR

A Portion of Remaining Extent of Erf 2100 Concordia
Nama Khoi Local Municipality

CONTENTS

1 INTRODUCTION

This document serves to comply with regulation 6 of the NEMA Financial Regulations (2015) that states that an applicant must determine the financial provision through a detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required for—

a) annual rehabilitation, as reflected in an annual rehabilitation plan;
b) final rehabilitation, decommissioning and closure of the prospecting, exploration, mining or production operations at the end of the life of operations, as reflected in a final rehabilitation, decommissioning and mine closure plan; and
c) remediation of latent or residual environmental impacts which may become known in the future, as reflected in an environmental risk assessment report.

The costs for rehabilitation included here are considered preliminary, speficially with regard the to the closure and rehabiitation of the Tailings Storage Facilility (attached as **Appendix D** to the FEIR), where additional detailed investigations are recommendations to inform the detailed design, and which could have associated costs currently unquantified and of relevance to the Closure Plan.

1.1 The annual rehabilitation plan

The annual rehabilitation plan provides for concurrent or progressive rehabilitation and contains information that defines activities on an annual basis and how these relate to the Final closure vision, as detailed in this final rehabilitation, decommissioning and mine closure plan.

The objective of the annual rehabilitation plan is to–

- review concurrent rehabilitation and remediation activities already implemented;
- establish rehabilitation and remediation goals and outcomes for the forthcoming 12 months, which contribute to the gradual achievement of the post-mining land use, closure vision and objectives identified in the holder's final rehabilitation, decommissioning and mine closure plan;
- establish a plan, schedule and budget for rehabilitation for the forthcoming 12 months;
- identify and address shortcomings experienced in the preceding 12 months of rehabilitation; and
- evaluate and update the cost of rehabilitation for the 12 month period and for closure, for purposes of supplementing the financial provision guarantee or other financial provision instrument.

Taking into acount the objective of the annual rehabilitation plan it is clear that it cannot form part of the environmental management programme to be submitted in terms of section 24N of the Act and the Environmental Impact Assessment Regulations, 2014 but will be submitted on an annual basis as part of the environmental audit report in terms of Regulation 34 (1)(b) of the NEMA EIA Regulations (2014), as amended by GN 326 of 7 April 2017.

1.2 Final rehabilitation, decommissioning and mine closure plan

According to the NEMA Financial Regulations the final rehabilitation, decommissioning and mine closure plan will form a component of the environmental management programme to be submitted in terms of section 24N of the Act and the Environmental Impact Assessment Regulations, 2014 and will be subjected to the same requirements of the environmental management programme regarding opportunities for stakeholder review and comment as well as auditing.

The objectives of this final rehabilitation, decommissioning and mine closure plan is to to identify a post-mining land use that is feasible through-

- providing the vision (goals), objectives, targets and criteria for final rehabilitation, decommissioning and closure of the project;
- outlining the design principles for closure;
- explaining the risk assessment approach and outcomes and link closure activities to risk rehabilitation;
- detailing the closure actions that clearly indicate the measures that will be taken to mitigate and/or manage identified risks and describes the nature of residual risks that will need to be monitored and managed post closure;
- committing to a schedule, budget, roles and responsibilities for final rehabilitation, decommissioning and closure of each relevant activity or item of infrastructure;
- identifying knowledge gaps and how these will be addressed and filled;
- detailing the full closure costs for the life of project at increasing levels of accuracy as the project develops and approaches closure in line with the final land use proposed; and
- outlining monitoring, auditing and reporting requirements.

1.3 Environmental risk assessment report

According to the NEMA Financial Regulations the environmental risk assessment report will also form a component of the environmental management programme to be submitted in terms of section 24N of the Act and the Environmental Impact

Assessment Regulations, 2014 and will be subjected to the same requirements of the environmental management programme with regards opportunities for stakeholder review and comment as well as auditing.
The objective of the environmental risk assessment report is to–

- ensure timeous risk reduction through appropriate interventions;
- identify and quantify the potential latent environmental risks related to post closure;
- detail the approach to managing the risks;
- quantify the potential liabilities associated with the management of the risks; and
- outline monitoring, auditing and reporting requirements.

This document then fulfills the requirements of both the Final rehabilitation, decommissioning and mine closure plan and the Environmental risk assessment report

2 CONTEXT OF THE PROJECT

2.1 Issues that have guided the development of the plan

Three approaches were employed to identify the key aims for the closure process that form part of the approved Final Closure Plan submitted and approved in terms of the MPRDA:

- Technical assessments which involved the recording of the project activities over the full life cycle of the mining operation (including closure) and the consequent potential impacts on the environment (including cumulative impacts). This resulted in the compilation of a closure plan that facilitated discussions with the authorities as well as Interested and Affected Parties (I&APs).
- Identification and consultation with the relevant authorities as well as I&APs to solicit/record their suggestions/issues/concerns.
- The collection of available/published environmental data, the review thereof for adequacy and hence the identification of the need for more comprehensive environmental studies/investigations and/or further information gathering.

Subsequent to the above activities/processes, an advertisement of the operations was placed in local newspapers to notify I&AP's about the intended project and invitations to register and participate in the consultation process. As a result of the consultation and recommendations from the environmental studies/investigations completed the applicant identified three key closure goals for the final decommissioning and closure of the mining operation that are listed below.

- To create a safe and healthy post-mining environment with no residual environmental impact.
- To create a stable, free draining post mining landform, which is compatible with the surrounding landscape
- To provide optimal post-mining social opportunities

Each goal is supported by a suite of key objectives and activities which are elaborated on in section 4 and 5 of this plan. This plan also describes how these objectives are planned to be met and elaborate on the implementation of certain risk mitigation actions (section 6). With risk assessment and mitigation being integral to the planning and executing of the rehabilitation and closure of the mine. Aftercare and maintenance of rehabilitated sites is often the difference between the ultimate successes or failure of rehabilitation and monitoring of rehabilitation will determine whether rehabilitation objectives and requirements are being achieved.
Several pieces of legislation are applicable to mine closure. Importantly, public participation is an integral part of mine closure and the process followed needs to fulfil the requirements of all relevant legislation. The following government departments have been identified amongst others as playing a key role in the closure process:

- Department of Minerals Resources (DMR): Competent Authority in terms of NEMA and NEM: WA; facilitator of closure inspections and issues the closure certificate;
- Department of Water and Sanitation (DWS): Lead agent for potential water related issues and signs off on the mine closure certificate, and issues the Integrated Water Use license;
- Provincial Department of Environment and Nature Conservation: Gives input into the closure plan and guides and monitors protection of the natural environment;
- The local municipality and district municipality. Gives input into the mine closure plan and interfacing thereof with their integrated development plan (IDP) of the local area.

3 MINE PLAN AND SCHEDULE

3.1 Mine Site Plans

The Mine Site Plan is included as Diagram 3b: Rietberg, 3c: Jubilee, 3d: Homeep and Diagram 4: Bulk Infrastructure as per the Draft EIR. The Locality Plan, project site with co-ordinates and ore bodies are included below.

Diagram 3b: Mine Site Plan for Rietberg

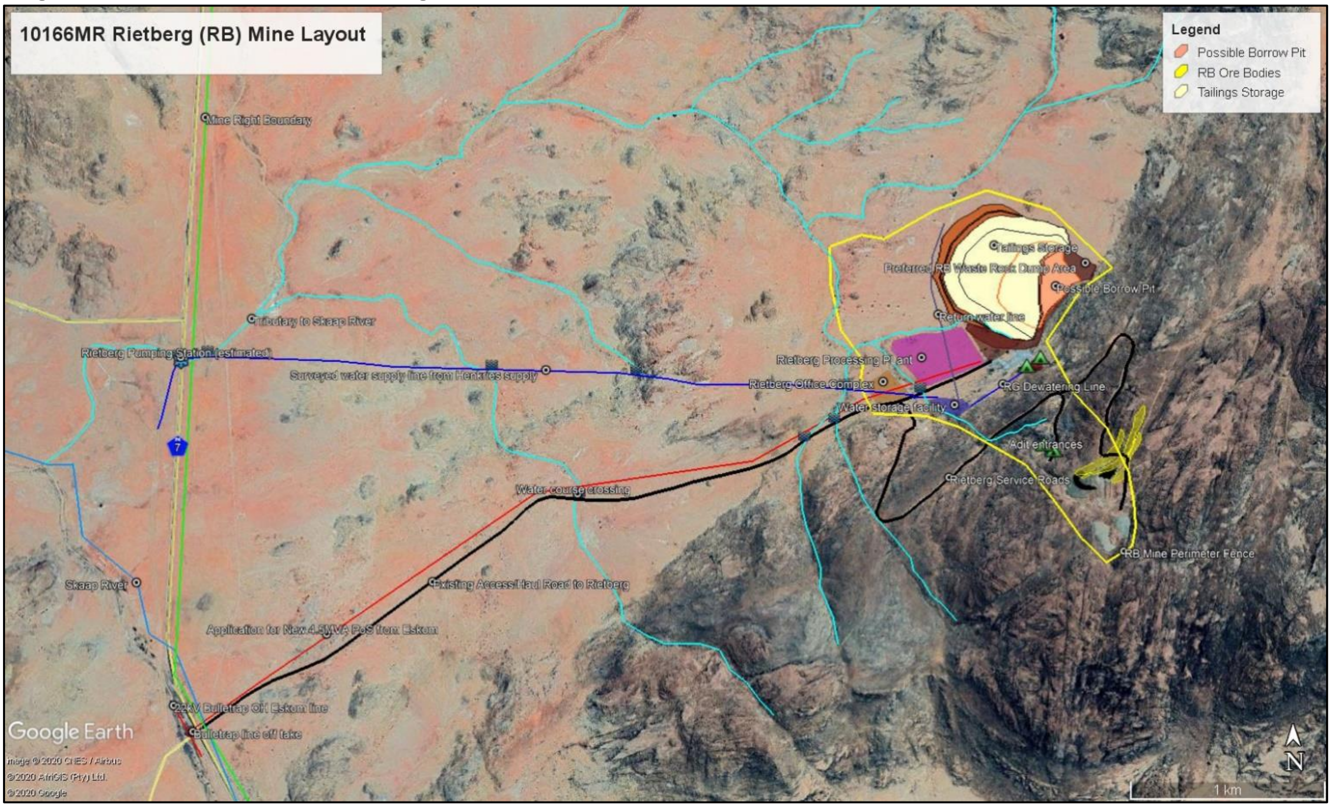


Diagram 3c: Mine Site Plan for Jubilee mine (Oct. 2020)

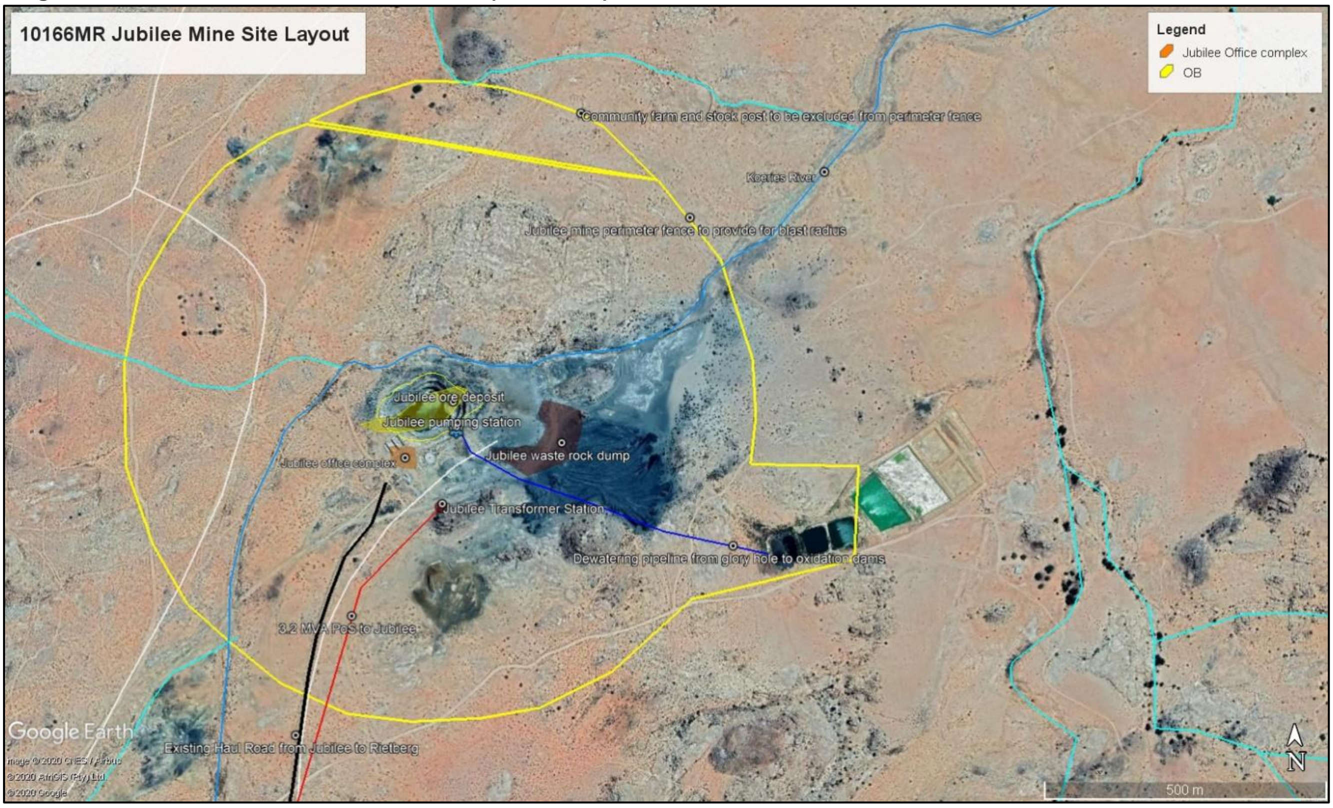


Diagram 3d: Site plan for Homeep mine (Oct. 2020)

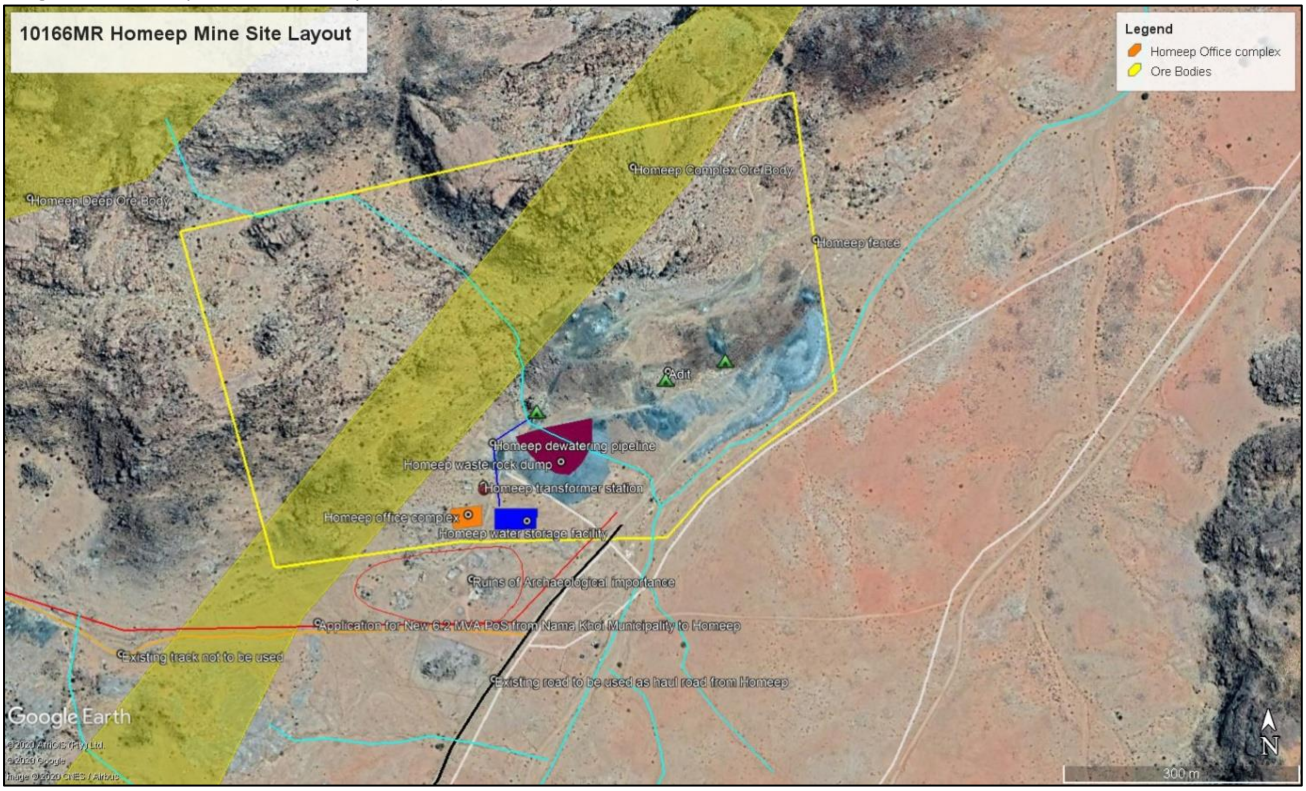
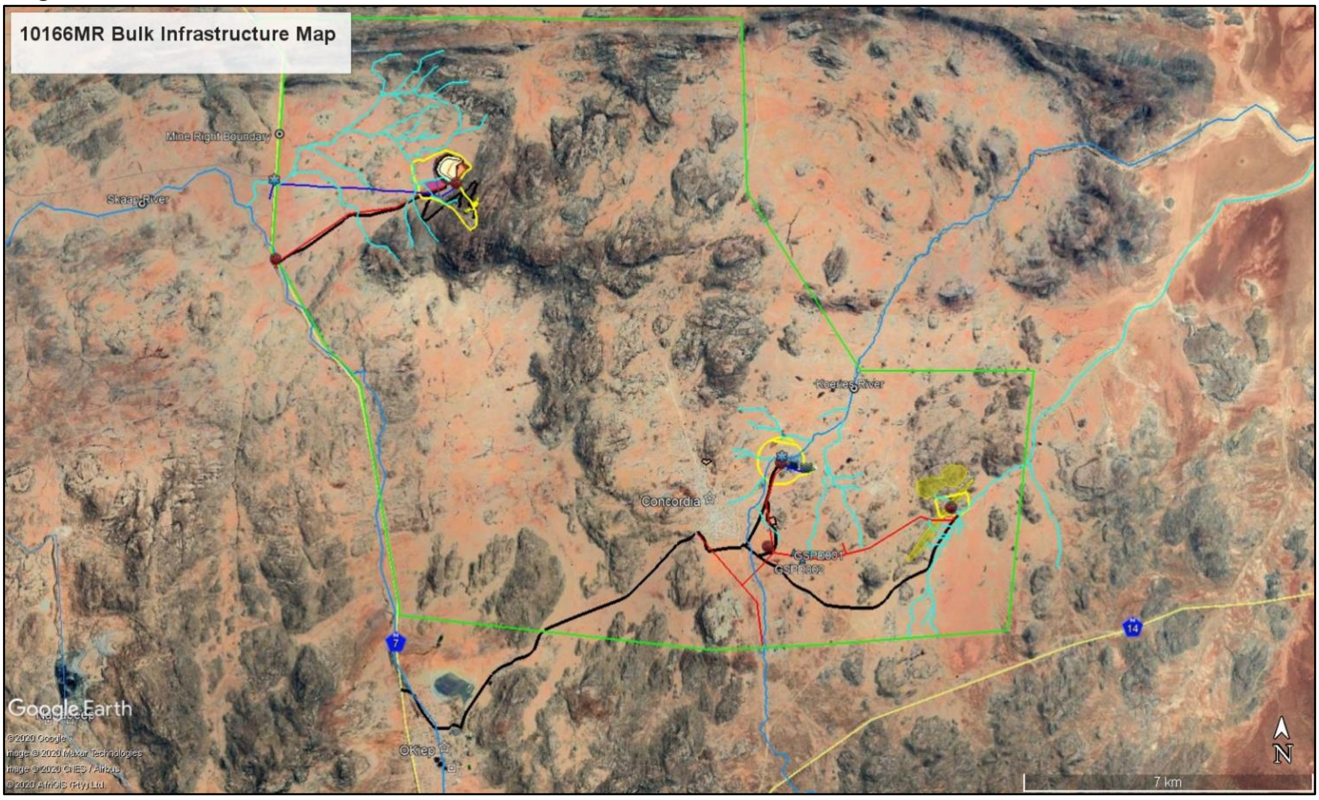


Diagram 4: Bulk Services Infrastructure



3.2 Project Description

The project description is copied from the Draft EIA Report to ensure consistency, and the table numbers, etc. have not been changed.

3.2.1 Proposed Road Access and Haul Routes

Refer to **Diagram 4** which shows the access roads and proposed haul routes.
The Rietberg Mine will be accessed by an existing gravel road located eastwards from the N7 approximately 19km north of the town of Springbok. This existing road that was built to access the historical Rietberg Mine will be required to be upgraded to accommodate heavy equipment and loaded haul trucks. The existing Rietberg Mine access and haul road length, approximately 4.6km in length can accommodate two-way traffic. Construction will be conducted by removing vegetation and topsoil, and through scraping and compacting of the area adjacent to the existing road.

Refer to **Diagram 4** which indicates the proposed transport routes for haul trucks between the Jubilee Mine and Rietberg Mine and between the Homeep Mine and Rietberg Mine, making use of the existing secondary roads in the area that can accommodate two-way traffic. These haul routes link to the N7 Provincial road just south of Concordia. The loaded haul trucks will travel northwards for a distance of approximately 11km before reaching the Rietberg Mine exit to the east of the N7, where the ore will be taken to the Rietberg Processing Plant.

The need for a new section of road has been identified to avoid transporting construction materials and ore (once the Jubilee Mine is operational), through the main sections of the town of Concordia, as shown by the by-pass on **Diagram 3c** and **Diagram 4** labelled as "Jubilee new haul road". There is however a section of the Jubilee Mine haul route, approximately 600m in length that passes through a section of residential houses where the road is surfaced, to the east and on the outskirts of Concordia. There is an alternative route to avoid this section of road through the community as shown on **Diagram 3c** and **Diagram 4**.

As urban expansion occurs in the town of Concordia, the potential road by-passes identified now could need to be revised for the Jubilee mine prior to mining commencing in year 8 of the proposed overall mine plan.

Base material for the new sections of roads referred to as the G4 layer is available from the oxidation ponds. This material has been tested and can be used. In addition, the Nama Khoi Local Municipality has a registered borrow pit at Concordia where base materials for the roads can be sourced, and the waste rock material from mining activities also provides a suitable source of base material.

3.2.2 Security and access control

Rietberg, Jubilee and Homeep Mines

A site perimeter fence around the development areas at the Rietberg, Jubilee and Homeep Mines will be required for safety and security purposes. The fence should be able to restrict access of livestock and other animals as well as prevent persons from any unauthorized access. The fence should have a total height of 2.4m. The fully galvanized wire mesh fence should be 2.1 m high with a razor mesh topping of 0.3 m and spacing between stay and intermediate posts of 3m.
Drones will be used to patrol the mine areas and will have a communication system linked to haul trucks and security that will patrol the mine areas to prevent accident and facilitate safe crossing of the haul road by animals and people. This system also has the least impact on the environment.
Access to the logistics area will be gained through two dedicated sliding vehicle gates and a single pedestrian gate. A security house will be located at the main entrance to the mining site area. Access to the complex by outside service providers will be strictly controlled, and where possible, limited to delivery at the main stores.

3.2.3 Power supply

Currently no power supply exists to the Mine Sites. In order to establish power to the project site a number of off-site installations will be required. This will include:

- Rietberg: There is an application for a new 4.5MVA power supply from Eskom's Bulletrap 22kV overhead powerline to the Rietberg processing plant requiring the construction of approximately 4,6km of 22 kV powerline from the Bulletrap Eskom line running along the N7. Refer to **Diagram 3b** and **Diagram 4**.
- Jubilee: The application includes a 3.2 MVA power supply to the Jubilee mine requiring the construction of 1,4km x 22 kV line from just after the Marlin Granite Mine to the sports field just outside the town of Concordia. Refer to **Diagram 3c** and **Diagram 4.**
- Homeep - Construction of 3.5km x 22 kV line from the sport field to the Homeep Mine. Refer to **Diagram 3d**.

Refer **to Diagram 4** which shows the bulk infrastructure including electricity supply overview for the mining right. Transformers will have to be constructed at the tap-off points at the mine site locations as indicated in the mine site layout plans (**Diagrams 3b, 3c** and **3d**).

The off-site power supply infrastructure will be designed on a maximum demand of 4.54 MVA to the Project Area at Rietberg during the 30 ktpm option. The Mines will feed off the Nama Transmission Sub-Station (Tx S/S) line.

The load summary is listed in Table 4 below.

Table 4: Project Power Supply Load Summary for 30 ktpm option

Area Description	Unit	Maximum Demand
Processing Plant	kVA	3035
Tailings Storage Facility	kVA	50
Mine Site	kVA	2200
TOTAL	**KVA**	**5285**

3.2.4 Water Supply

Groundwater status quo

Refer to Hydrogeological Assessment attached at **Appendix E** (SRK; May 2020) and the description of the water resources in Section 8.1.8.2 where the groundwater quality and quantity are summarised. As referenced from **Appendix E**, the groundwater in the area is naturally of poor quality and generally unfit for long term human consumption unless treated.

The groundwater quality of water abstracted from Jubilee mine and O'Kiep mine, if the latter is to be used for water supply, is of very poor quality with many constituents exceeding the DWA (2013) permissible limits for discharging wastewater to water resources. High sulfate concentrations, fluoride and salinity, and above background trace-metal concentrations, especially uranium, of groundwater abstracted from Jubilee and O'Kiep mines are indicative of pollution from the old mines and associated remnants of their sulfide orebodies.

Aquifers in the area are predominantly of the fractured-rock type and are generally low yielding with very low transmissivities, poorly developed fracture systems of limited extent and are classified as minor aquifers. In many areas of the site, the bedrock is solid with no fractures and hence no groundwater is present. Boreholes drilled in these areas remain dry with no evidence of groundwater ingress. Groundwater usage in the study area is very low and mostly for livestock watering;

Process water supply is proposed to be sourced from the O'kiep Copper Mine where approximately 4 billion litres of water is present within the old mine workings. The O'Kiep Copper Company (OCC) in partnership with ReThink Resources plan to apply for a water use licence to extract copper from the water in the old mines and to use the water that has been cleaned to truck it to the Rietberg mine site in container tankers to fill up a reservoir at the mine site. The water use license process is a separate process to the water use license required for this mining right. All process water for the Rietberg processing plant will therefore be trucked to the site and no process water supply lines will be necessary. The application to treat the O'Kiep open pit water is yet to begin, and establishment of the treatment facility at the source means that the timeframes for the supply of this treated water are unknown.

The dewatered groundwater from the mine shafts will be stored on site to be used in processing. More information of the groundwater quantity and quality and the impacts of the drawdown of the dewatering process are detailed in **Appendix E**.

Potable water is to be sourced from the Municipal Henkries supply line that runs parallel to the N7 in close proximity to the Rietberg Mine, from where the potable water is proposed to be accessed via a pump station as shown on **Diagram 3b** and **Diagram 4** showing the proposed bulk services layout.

A total water allowance of 150 l/person/day has been made. The various unit conversions for potable water supply to be utilised to determine pumping, storage and treatment capacities include:

- Potable water 178 employees x 150 l/person/day = 26,700 l/day
- Process water for mine site and dust suppression – 750 m^3/month for 30 ktpm option
- Process water for processing plant the 30 ktpm option - 18,000 m^3/m

3.2.5 Water Management

All dirty rainfall run-off, process plant discharge, treated sewage and grey water will be collected, stored, treated and recycled as far as possible. Should an excess of water exist on the operation, all effluent from the site will be suitably treated and tested to ensure compliance to acceptable standards before being released into the environment. All clean rainfall run-off should be diverted from dirty and contaminated areas to minimize the risk of environmental and water pollution. Trenches or berms will be constructed to divert clean run-off, collect dirty run-off and route dirty water to suitable storage dams. The low rainfall in the area means that little stormwater run-off can be expected.

Appendix D details the clean and dirty water management of the Tailings Storage Facility (TSF) and includes the design of a surface water diversion system around the TSF in section 3.3.10 below.

3.2.6 Mine logistics

The mine logistics is the area where the mining contractor and relevant technical services personnel will manage each mine. Each mine site will be enclosed by a security fence. Access to the site will be controlled by security personnel posted at the access gates to the site. The mine site will include offices, change houses, control room, first aid station, stores, waste handling area, explosive delivery area, earth moving vehicle and engineering workshops as well as an earth moving vehicle parking area, fuel storage facility and a wash bay. This area will be mainly constructed and established by the appointed mining contractor but services like water supply, power supply, water management and other services will be constructed by contractors appointed for the construction of the balance of infrastructure areas.

Effluent will be managed by means of a treatment facility called a "Biozone", which is a mobile container that treats effluent above ground in tanks within a container. This method of effluent management avoids the disposal of sewage into underground septic tanks or soakaways. The capacity will be selected to manage the number of staff on site, and the bioreactor flow rates range from 2.5 to 40kl/day.

3.2.7 Processing Plant Design

The processing plant site will include the processing plant, a metallurgical and assay laboratory, offices, reagent storage facility and a workshop located at the Rietberg Mine as shown in **Diagram 3b**. The process flow (refer to summary included as **Diagram 6**) is made up of the following components. Diagrams of these components will be provided in the EIA Report.

- Crushing circuit
- Secondary crushing circuit
- Mill Feed Stockpile
- Milling circuit
- Flotation Feed circuit
- Rougher Flotation circuit
- Cleaner Flotation circuit
- Re-cleaner Flotation circuit
- Concentrate Thickening circuit
- Tailings thickening circuit
- Concentrate Filtration circuit
- Flocculant Make-up circuit
- Depressant Make-up circuit
- Frother, Xanthate and co-collector dosing circuit
- Utilities Water circuit
- Utilities Air circuit

Crushing

Ore from the Run of Mine (RoM) stockpile at the Rietberg Mine will be conveyed to the processing plant and discharged into the jaw crusher feed bin which is fitted with a vibrating grizzly feeder. The vibrating grizzly undersize combines with the jaw crusher discharge and is fed to the secondary crusher screen. The vibrating oversize is fed into a jaw crusher where the size of material is reduced from 500 mm to 80 mm suitable to be fed to the secondary (cone) crusher.

The crusher discharge together with vibrating grizzly undersize is fed to the secondary crusher double deck screed. The top deck has an aperture of 50mm with the bottom deck having an aperture of 15 mm. The oversize of both decks is fed into the secondary cone crusher that reduces the material to less than 15mm. The secondary cone crusher product is recycled back to the secondary screen feed conveyor and combines with the vibrating grizzly undersize, as feed, to the secondary crusher feed screen. The undersize from the screen is conveyed onto the mill feed stockpile.

Milling
The product, from the crusher circuit, is conveyed to the mill feed stockpile with a live capacity of 8 hours. Vibrating feeders underneath the stockpile will discharge mill feed onto the mill feed conveyor.
The ball mill grinds at 65-70 % solids (RD of 1.7-1.8) using steel balls as grinding media. Mill feed dilution water is added if required, to maintain the required in-mill density. The mill discharge gravitates to the mill discharge sump in which dilution water is added. The content of the mill discharge tank is pumped to a classification cyclone with a cut point of 150 um. The cyclone underflow is returned to the mill feed hopper while the cyclone overflow reports to the flotation feed surge tank.

Flotation
Collector, frother and depressants are added into the rougher flotation feed tank to condition the slurry prior to flotation. Water is added, if required, to reduce the density to 1.33; an adequate density for flotation treatment. The content of the feed tank is pumped to the first cell of the flotation rougher bank.

Rougher Flotation
The rougher flotation circuit has a residence time of 31 minutes and uses 5 tank cells. The cells are air induced using blowers. All concentrate from the roughers cells is pumped to the Cleaner flotation cells. The rougher cells tails gravitate to the rougher tailings tank from where it is pumped to the Tailings thickener. All walkways on the float section will be below float cell lips in order to ensure access to overflow launders.

Cleaner Flotation
The cleaner flotation circuit has a residence time of 30 minutes and uses trough type cells comprising of 2 banks of 2. The cleaner concentrate gravity flows via launder piping to the designated concentrate froth pump. Each bank will have its own dedicated froth pump which will allow for potential re-circulation of second cleaner bank to cleaner feed in events of low-grade feed. The concentrate is then pumped to the re-cleaner flotation.
The cleaner tailings are pumped to the rougher feed tank for circulation through the roughers.
<u>Re-Cleaner Flotation</u>
The re-cleaner flotation circuit has a residence time of 25 minutes and uses two (2) banks of two (2) trough type cells. The re-cleaner concentrate of each bank gravity flows via launder piping to the designated concentrate froth pump. The concentrate from the re-cleaners is pumped to the concentrate thickening circuit.
The re-cleaner tailings simply gravitate, in closed circuit, to the cleaner flotation cell feed.
<u>Concentrate Thickener and Concentrate Handling</u>
Final concentrate from the re-cleaners is thickened in a high rate thickener, underflow of which is pumped to a transfer tank. The final concentrate is then filtered by filter press, and the filter cake stockpiled prior to dispatching.
Concentrate thickener overflow gravitates to a spray water tank where it will be used as spray water in the flotation circuit. The filter press filtrate is pumped to the spray water tank.
<u>Tailings Thickener and Tailings Handling</u>
The flotation plant tailings are pumped to the tailing's thickener, to increase the density and recover process water prior to pumping the tailings to the TSF. Flocculant is added to the thickener to aid the settling of the material. The water recovered from thickener overflow gravitates to the process water tank. The thickener underflow, at a density of about 1.55, is pumped to the Tailings Storage Facility (TSF).
Flocculant is added to the thickener to aid the settling of the material. The water recovered from thickener overflow gravitates to the process water tank. The thickener underflow, at a density of about 1.55, is pumped to the Tailings Storage Facility (TSF).

Water Circuit
<u>Process Water Handling</u>
Process water overflow from the tailing's thickener gravity flows into a process water tank. From the process water tank, it is pumped back to the process for re-use. Overflow from the process water tank gravity flows to the tailings transfer tank.
<u>Potable Water</u>
Potable water is used for safety equipment like showers and eye washes. It is also used as gland service water and reagent make-up water. Potable water is supplied from the mine into a potable water holding tank. Reagent make-up will make use of potable water.
<u>Spray Water</u>
Spray water is made-up of concentrate thickener overflow and filtrate and will be stored in a holding tank. Spray water is pumped to the flotation circuit to be used in all the overflow launders.

Reagents Handling
A reagent storage shed will be located adjacent to the reagent make up facility.
- <u>Collector</u> – Xanthate is delivered in 40% strength solution, 1m³ plastic containers. The solution is pumped to the rougher feed tank ahead of the rougher flotation using small peristaltic pumps. There is also an optional extra pumping line to

the cleaner flotation feed. Standby pumps will be allowed for in this area. The impact on safety and flame proofing requirements will be considered in the Mine Health and Safety Plan.

- Frother is delivered in 100 % strength solution, in 20 litre containers. The solution is pumped to rougher flotation using a small peristaltic pump. There is also an optional extra pumping line to the cleaner flotation feed. Standby pumps should be allowed for in this area.
- Depressant is delivered as dry powder. The solution is made up to 1% strength in a make-up plant that consists of mixing, agitating and hydration steps. The solution is pumped to the flotation feed surge tank ahead of the rougher flotation. There is also a pumping line to the cleaner flotation feed, as well as a spare pump and line to be used in the re-cleaners.
- Flocculant is delivered as a solution or powder. The flocculant will be diluted to the required strength in the make-up plant prior to dosing. The flocculant is then pumped to the respective thickener feed boxes.

Process Control and Automation

Monitoring and Control instrumentation for operating the sulphide flotation plant will be installed in order to minimise manual supervision and control requirements.

Sampling and Evaluation

- Routine quality checks for the relevant elements of the feed will be taken automatically prior to reporting to the surge feed tank, by using a primary and secondary combination of rotary vezin[1] cutters. The combined sample will be taken after the mill prior to the rougher feed tank.
- The rougher tailing sample will also be taken prior to the tailing's thickener using rotary vezin cutters. The re-cleaner flotation concentrate is sampled using rotary vezin cutters prior to the final concentrate thickener.
- The final concentrate is sampled prior the filtration feed tank also using a rotary vezin cutter.

Slurry Handling

General spillage from within the various sections of the flotation plant will be contained within a five degree (5˚) sloped, bunded concrete area. Floors will be sloped towards a spillage sump with a one cubic meter (1 m³) capacity, which will be protected with a 6 mm slotted wedge-wire screen.

A vertical spindle type sump pump will be used to transfer the spillage within the following circuits:

- Mill circuit, into mill feed hopper
- Flotation circuit into either final tailing tank or feed tank.
- Concentrate circuit, into concentrate thickener.
- Tailing circuit, into tailings transfer tank.
- Reagents circuit, into rougher tailings tank
- Utilities circuit, into flotation feed.

3.2.8 Efficiency of process

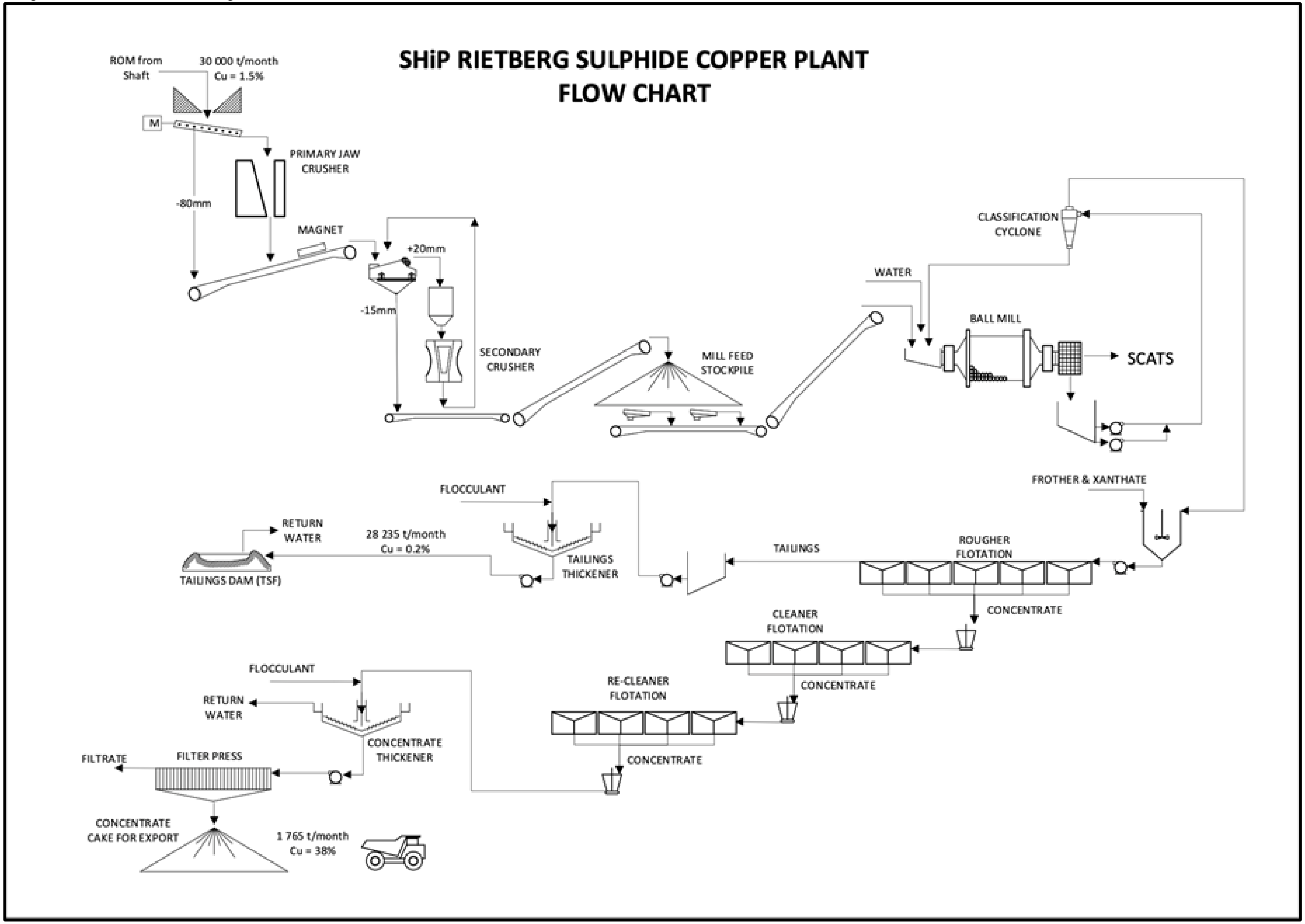
The copper will be upgraded by means of flotation with the final flotation concentrate representing 10 % to 12% of the original mass of the plant feed. 90% of the copper will be contained in this fraction. This will be the final product. It will be filtered (dewatered), bagged, and sold at the mine gate. The reclaimed water will be returned to the process water circuit.

The remaining 88% to 90% of the original plant feed will be discarded as flotation tailings.

This product, grading at 75% passing 106 microns, will be pumped to the tailings disposal facility (TSF), which will be a contained area 450m from the processing plant. The TSF will be self-raising. The tailings will be pumped at 50% solids and allowed to settle on the TFS. Water will be recovered and returned to the plant for re-use, thereby reducing the raw water requirement.

[1] Vezin - refers to a rotating cutter that passes at constant speed through the falling stream of slurry or free flowing solids entering it..

Diagram 6: Process Flow Diagram



3.2.9 Waste Rock Dumps and Stockpiles

Waste rock dumps must be designed to meet minimum slope stability and safety standards and vegetated to reduce erosion and runoff. Examples of waste rock dump classifications are provided in **Diagram 7** below.

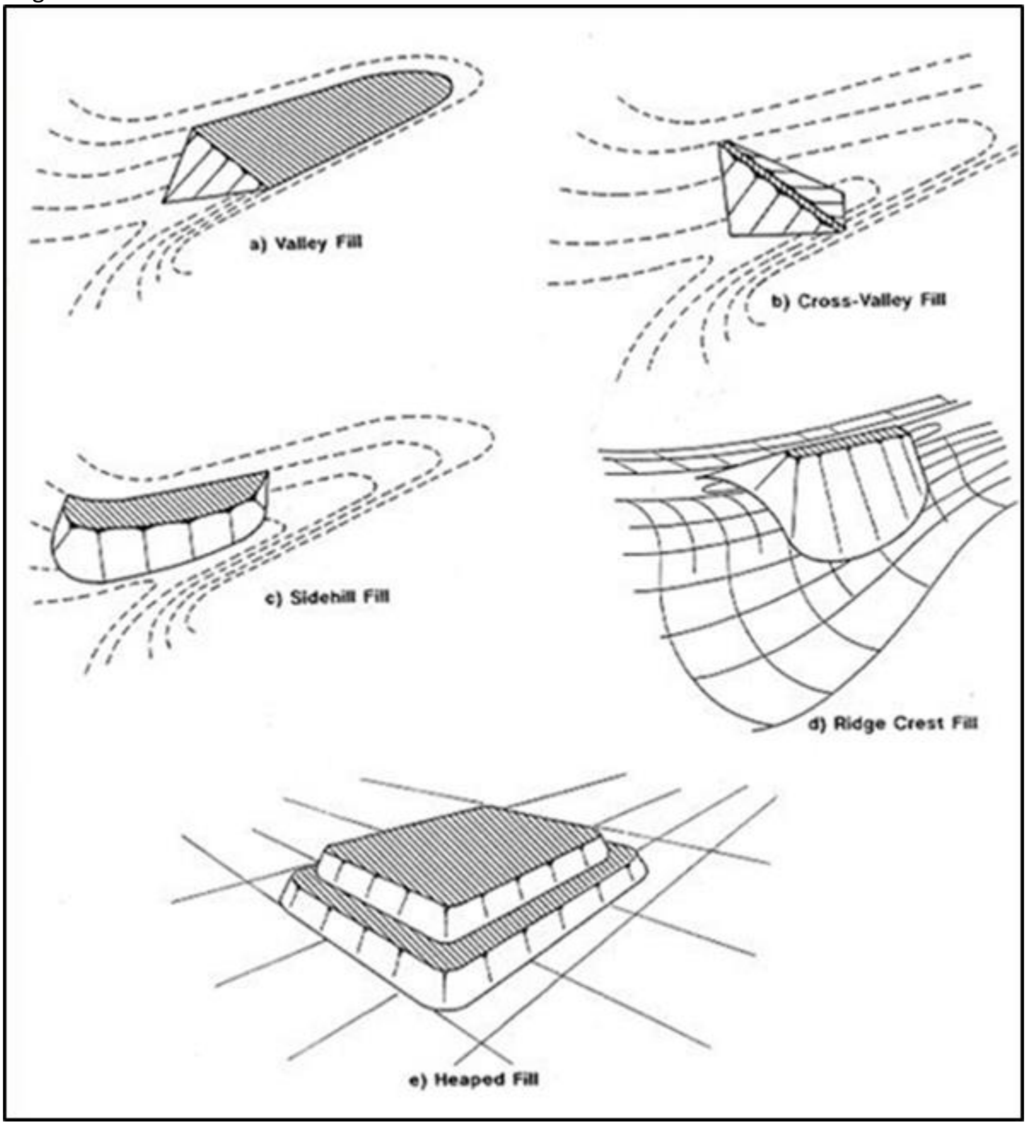
In mountainous terrain consisting of natural depressions along the slope and with the limited topsoil available, the best option for waste dumps is filling and levelling the top of these natural depressions called “valley fill”.

Waste rock dumps on the sides of kopjes “sidehill fill”, which have large slopes will be terraced once the dump has reached its final profile at the top level, by dumping additional material along the sides at progressively lower levels, and developing these terraces at differing angles.

In the case of waste rock dumps in valleys “heaped fill” excavations are used with the final designed perimeter of the waste rock dump created to obtain cover material for the top of the dumps and profiling the slope of dumps. Dumping will proceed above surface on the top of this buried dump at successive tiers with an appropriate height of around 6 to 10m, leaving terraces of 6m wide and working from the perimeter toward the centre. This will allow for reclamation of the outside profiles at a much earlier stage, resulting in very little outstanding reclamation toward the end of the life of the dump.

Waste rock dumps are included at each mine site as shown in **Diagram 3b, Diagram 3c and Diagram 3d** above.

Diagram 7: Mine Waste Rock Classification



The Run of Mine (RoM) stockpile will be sized to ensure sufficient supply to the plant for a minimum of 3 months. With a 30 ktpm production profile this will amount to 3kt per day. The stockpile thus needs to be a minimum size of 90,000t. Existing waste rock dumps from historical mining will be expanded wherever possible.

Table 5: Waste Rock Dumps & RoM Stockpile based on the 30 ktpm Design Parameter

Description	Unit	Rietberg Upper WD	Rietberg Lower WD	Jubilee WD	Homeep	ROM Stockpile
Height	m	67	20	27	67	4
Width	m	295	130	210	295	30
Length	m	24	240	210	24	30
Wall Gradient	degrees	37	30	33	37	33-37
Stockpile/Waste Dump Volume	m3	450 000	385 000	520 000	450 000	-
Footprint Area	m2	49 500	28 300	35 200	49 500	900
ROM Stockpile Tonnage	t					10 500

3.2.10 Tailing Storage Facility (TSF)

Design Criteria and Battery Limits
Refer to the Definitive Feasibility Study Design of Tailings Storage Facility (October 2020) attached at **Appendix D**. The proposed facility is required to accommodate 15 years of tailings production at a rate of 480ktpa dry tons of solids per annum, which relates to a maximum storage capacity of 7.2Mt of tailings during the life of mine. The tailings will arise from the processing of a copper ore body.

The required storage volume for the facility has been calculated based on an estimated average in-situ dry density of the tailings product of 1.375t/m^3 based in turn on a particle specific gravity of 2.75 and an estimated average in-situ void ratio of 1. The tailings will be pumped to the TSF in a slurry comprising 45-55% solids by mass. At an estimated particle SG of 2.75, the slurry density is expected to be between 1.47 and 1.54 t/m^3.

The battery limits for the design of the facility have been defined as:

- The first flange of the overland slurry delivery line(s) after the line crosses into the site of the TSF as defined by the innermost of the perimeter access road or storm water diversion works.
- The surface of the decant pond.
- The perimeter fence of the TSF.

It should be noted that the scope as defined is intended to exclude all mechanical equipment and power supply to the slurry pumping and return water systems from the design of the TSF.

Selection of Preferred Site for Development of the TSF
A preferred site for the establishment of the TSF has been identified to the North-West of the proposed Rietberg Mine processing plant. The site was selected based mainly on consideration of surface drainage systems and the presence of protected species, as well as the prevailing wind direction, visibility of the facility and the location of a potential borrow pit for the construction of TSF starter embankment. Refer to **Diagram 3b** and **Diagram 8f** and the site selection process described in Section 6.2.3 below.

Waste Classification and Selection of Containment Barrier System
Waste classification of the tailings has been carried out (Future Flow GPMS cc, January 2020) in accordance with the requirements of NEM:WA on two representative samples of copper ore tailings (CJB Epoch 1B and 1C Flotation Tailings). The Acid-Mine-Drainage (AMD) potential of the samples was also determined by Acid-Base-Accounting (ABA). The waste classification and ABA testing processes concluded that:

- Both tailings samples classified as Type 3 Wastes, requiring disposal to a site with Class-C containment barrier system.
- Neither of the tailings samples are expected to be acid forming.

Based on detailed assessment of the waste classification and a review of the reports on groundwater conditions and usage, it is believed that a case could be made for the risk based relaxation of the requirements for the containment barrier system to the TSF, based on:

- The absence of leachable contaminants in the tailings, with all potential contaminants complying with the LCT0 guideline values.
- The nature of the groundwater which has been assessed by SRK (**Appendix E**) as being of poor quality and generally unfit for long term human consumption unless treated, with usage very low and mostly for livestock watering.
- The expectation, based on modelling by SRK, that the potential contaminant plume from an unlined TSF would not have spread more than 150m from its footprint.

Notwithstanding the potential for relaxation of the requirements for the installation of the containment barrier system, SHIP have indicated to Epoch their preference for the inclusion of a Class C containment barrier system into the design of the proposed TSF.

Geotechnical Investigation

A geotechnical investigation of the proposed site of the TSF was carried out and documented (Bear GeoConsultants, January 2020) in accordance with prescribed standards. The investigation comprised:

- The excavation of fifty-one test pits were excavated using a 320D CAT excavator. It is noted that the preferred location of the TSF was amended and finalized after the geotechnical investigation. The excavated test pits did however, cover the area of the starter embankment and also assisted in the identification of a potential source of borrow material for its construction.
- Profiling of the test pits by an engineering geologist in accordance with using standard procedures (SABS, 2012), and the retrieval of samples considered representative of the soil horizons on the site.
- Laboratory testing of the soil samples retrieved from the test pits to enable their classification and to determine their strength and hydraulic conductivity parameters and suitability for use in construction.

While amendments to the layout of the TSF resulted in the test pits not covering the entirety of the TSF basin, this is not believed to be a concern based on the uniformity of the soil profiles, which are described as comprising a thin cover of transported soils underlain by shallow, hard rock granite gneiss. A thick drift of sand was identified on the eastern portion of the TSF footprint at the foot of the hill forming the south eastern boundary and is considered a suitable source of construction material for the TSF starter embankment.

Description of the Tailings Storage Facility

The TSF will be constructed as a conventional self-raised facility consisting of a starter embankment from which wall raises will be constructed using dried tailings once the basin behind the embankment is filled. The facility will be equipped with a containment barrier system to prevent the release of seepage its foundation and promote the recovery of water for reuse. The facility is to consist of:

- An engineered earth fill starter wall with side slopes constructed to 1V:2.5H (upstream) and 1V:3H (downstream) respectively and a crest width of 6 m
- A Class C Containment barrier system to the basin and inside slopes of the facility comprising a 1.5mm HDPE liner, underlain by a Geosynthetic Clay Liner (GCL)
- A system of drains to prevent the build-up of water pressures on the containment barrier system, promote drainage and consolidation of the deposited tailings, and to ensure the structural stability of the facility comprising:
  - A graded sand and stone blanket drain located beneath the planned crest location of the TSF, with outlets located at 50m centres.
  - Graded sand and stone outfall trenches and drains at 50m centres along the perimeter of the TSF.
  - A curtain drain with outfalls at 50m centres within the starter embankment to protect it against seepage in the event of a failure of the liner system to its inside face.
- A contaminated water collection and containment system comprising:
  - A solution trench collecting water from the drains within the TSF and starter embankment.
  - A concrete lined sump to store drainage water, from where it can be pumped to the plant.
  - A series of unlined toe paddocks and cross walls to retain storm water runoff from the outer face of the TSF embankment and to protect the solution trench against siltation.
- A decant tower and associated waste rock access wall to enable the collection of excess slurry and stormwater runoff water from the basin of the TSF, which would be pumped directly back to the plant for reuse. The system will comprise a series of intermediate inlets to promote the early recovery of water until the decant pool can be located in its final position and will also enable the collection of all excess water off of the basin of the TSF as well as some interstitial water which would drain to the inlets.
- A surface water diversion system to ensure clean stormwater runoff is diverted around the facility, comprising:
  - A Northern storm water diversion trench between the TSF and the Archaeological site.
  - A Southern storm water diversion trench between the TSF and the processing plant.

Water Balance Calculations

Water balance calculations have been carried out for the TSF to estimate the expected rate of slurry water return capacity to store runoff associated with rainfall on the basin. The water balance model and calculations illustrate that:

- Between 45 and 50% of the slurry water pumped to the facility would be available for return to the plant.
- While stormwater runoff to the basin of the facility would supplement the water available for reuse during the rainy season, it is unlikely that such water would ever entirely negate the need for plant make-up water to be sourced elsewhere.
- Average monthly rainfall and storm events of up to 7 days duration and 200 years recurrence interval are unlikely to result in the storage of more than 50 000m^3 on the facility.

- Given the limited requirement for storage of runoff on the TSF, and the demand for make-up water in the plant, it is proposed that excess water on the facility be returned directly to the plant, negating the need for the construction of a storm water control dam.

Hazard Classification of TSF

Based on the prescribed hazard classification criteria (SANS 0286:1998, 1998) the TSF has been classified as a High Hazard facility based on its Zone of Influence (ZOI) extending to the N7 national road and bridge to the west. It is considered unlikely that more than 10 residents or 100 employees would be present in the ZOI at any given time. The design, construction, operation and eventual rehabilitation and closure of the TSF will have to comply with the requirements specified for High Hazard facilities.

Slope Stability Analyses

Seepage and slope stability assessments have been carried out on the TSF, the results of which illustrate that the factors of safety against failure are a function of the location and levels of water being stored behind the starter embankment, the physical configuration of the embankment, the interface shear angles between the layers of the containment barrier system, and the functionality of the drainage systems to the embankment and the basin of the facility. The analyses confirm that the factors of safety against failure of the facility are within accepted norms for both static and pseudo-static loading scenarios.

Table 6 presented below provides the summary tailings production plan referenced from **Appendix D**, Section 3.2.

Table 6: Rietberg Mine Summary Tailings Production Plan

PARAMETER	UNIT	RIETBERG TSF
OPERATING LIFE OF TSF	years	15
TAILINGS PRODUCTION RATE	dry ktpa	480
TOTAL TAILINGS PRODUCTION	Mt	7.2
PARTICLE SPECIFIC GRAVITY	t/m^3	2.75
ESTIMATED LONG TERM IN-SITU VOID RATIO		1
ESTIMATED LONG TERM IN-SITU DRY DENSITY	dry t/m^3	1.375
TAILINGS STORAGE CAPACITY REQUIRED	Mm^3	5.237

Optimisation of Site Layout

The site selection process for the location of the TSF is described in Section 4 of **Appendix D**, and in Section 6.2.3 of the DEIR under Location Alternatives.

The preferred and only alternative is shown in **Diagram 3b** (and Figure 5 in **Appendix D**) is located further up the slope to the West and towards the area of the Waste Rock Dump. While the site encroaches on a minor drainage line, it avoids the larger surface water features and would enable the consolidation of the Waste Dump and TSF pollution control works. The facility is also located over a potential borrow area identified during the geotechnical investigation, which could be incorporated into the facility, thereby reducing the overall surface disturbance.

Table 7 below provides a summary of the stage calculations for comparison purposes and provides useful information on Option 3 (as per **Appendix D**) which is the preferred and only design and location option for the TSF as described in Section 6 above.

Table 7: Summary of Results of stage capacity calculations on TSF (Table 4 in Appendix D)

PARAMETER	UNIT	TSF1	OPTION 1	OPTION 2	OPTION 3[2]
STORAGE CAPACITY	yrs	15	15	14	15
DATUM LEVEL	m.a.m.s.l.	841	866	849	882
MAX CRES ELEVATION	m.a.m.s.l.	884	902	906	926
MAX TAILINGS ELEVATION	m	43	51	57	44
TSF CAPACITY	Mt	7.225	7.422	6.880	7.352
TSF CAPACITY	10^6 x m^3	5.254	5.378	4.985	5.328
CREST AREA	ha	17.48	26.09	17.30	19.04
FOOTPRINT AREA	ha	36	39	34.3	33.4
TERMINAL RATE OF RISE	m/yr	2	1.33	2.01	1.83
STARTER WALL VOLUME	m^3	185,000	572,232	538,610	325,984
STARTER WALL HEIGHT ABOVE DATUM	m	19	27	28	15.5
MONTHS TO STARTER WALL CREST	mnth	23.69	25.07	17.30	19.89
RATE OF RISE AT STARTER WALL CREST	m/yr	3.2	3.0	3.6	3.1

3.2.11 Project Services

Owing to the remote nature of the project area a number of services will need to be supplied by personnel and infrastructure on site. These services will include the treatment of potable water, the treatment of sewage in the Biozone facilities, basic medical and firefighting services, and waste handling and removal as well as information and communication services.

Sewage treatment will be in the form of Biozones which are mobile containerised treatment plants. Wastewater from this plant will be recycled and utilised as service and process make up water.

A first aid station will be available at the mine site for first response to any medical emergency on the mine. This facility will be equipped for the treatment of minor to medium severity medical emergency and will serve as a first response / stabilisation facility from major medical emergencies. Patients will be transported from here to the nearest hospital for further treatment should it be required.

A firefighting truck will form part of the project services vehicles. A waste handling and dispatch facility will also from part of the mine site and will allow for the collection of all types of waste generated by the operation and will be transported to suitable disposal facilities in the area.

Lastly, Information Technology (IT) and communication infrastructure will be installed at the mine site to allow for the effective capture and management of relevant information and ensure clear and effective communication across the Project site and externally off-site.

3.2.12 Rehabilitation, decommissioning and Mine Closure

The final Rehabilitation, Decommissioning and Closure Plan (**Appendix G**) addresses the following measures:

- Removal of all structures and infrastructure not to be retained by the landowner in terms of section 44 of the MPRDA.
- All fixed assets that can be profitably removed will be removed for salvage or resale.
- Any item that has no salvage value to the mine, but could be of value to individuals, will be sold and the remaining treated as waste and removed from site.
- All structures will be demolished and terracing, and foundations removed to the lesser of 500 mm below the original ground level.
- Inert waste, which is more than 500 mm underground, such as pipes, will be left in place
- All services related to the mining operation, water supply lines and storage on site will be demolished.
- The TSF and development areas will not exceed the planned footprint. Recommendations for the decommissioning, closure and rehabilitation of the residue stockpile are to be provided in the Specialist Report to be prepared in accordance with the “Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation” in GNR 632 of 24 July 2015 (in GG No. 39020).

[2] Option 3 is the Preferred and Only location of the TSF

- The post-mining pit stability and waste dump profile will be addressed as part of the operational processes and necessary remedial actions implemented prior to closure.

3.3 Description of the activities to be undertaken

The project is divided into three phases as listed below:

- Construction: including the construction of infrastructure, mine or pit footprint, access ramps and haul roads, waste rock dump, residue and product stockpiles, handling areas, water storage and reticulation, stormwater management structures, and electrical connections to the existing substation in … with an …kV line to the project site, detailed further in Section 3.4.1 below
- Operation: Mining below ground, processing activities, operation of the logistics, and all mining infrastructure detailed further in Section 3.4.2 below.
- Decommissioning and Closure: As detailed further in Section 3.4.3 below. This phase addresses the scaling down of activities ahead of temporary or permanent closure, cessation of mining or production, implementation of the rehabilitation programme, monitoring and maintenance for prescribed period after cessation of operations; and closure, including completion of rehabilitation goals, application for closure, transfer of liability to the State and agreed post-closure monitoring or maintenance.

The methodology and technology to be employed in each phase is described in detail in Section 3.3 above and summarised below:

3.3.1 Construction Phase: Development of infrastructure and logistics

The construction phase entails the development of the infrastructure and logistics, including the removal of vegetation and topsoil in preparation of development footprints:

- Erect perimeter fences for safety and security purposes, and to demarcate the project site. The fence should have a total height of 2.4 m. The fully galvanised wire mesh fence should be 2.1m high with a razor mesh topping of 0.3m and spacing between stay and intermediate posts of 3m.
- Upgrade existing access roads and develop new access roads, with removal of vegetation and topsoil prior to construction as detailed in Section 3.3.1 above and shown in **Diagram 4: Bulk Services**.
- Provide electrical supply to each mine as there is currently no power supply to theses= sites. In order to establish power to the project site each site will require a transformer as shown in the Mine Site Layout Plans (**Diagrams 3b, 3c** and **3d**).
- Development of water supply and water management infrastructure to Project Area for all activities requiring water for processing and consumption; diverting stormwater and recycling. Water supply is an essential service as various steps in the mining and particularly the processing processes are heavily reliant on the usage of water.
- Development of mine logistics. The mine logistics will be the area from where the mining contractor and relevant technical services personnel will manage the mine. The mine site will be enclosed by a security fence. Access to the site will be controlled by security personnel posted at the access gates to the site. The mine site will include offices, change houses, control room, first aid station, stores, waste handling area, explosive delivery area, earth moving vehicle and engineering workshops as well as an earth moving vehicle parking area, fuel storage facility and a wash bay. This area will be mainly constructed and established by the appointed mining contractor but services like water supply, power supply, water management and other services will be constructed by contractors appointed for the construction of the balance of infrastructure areas. The construction of the hydrocarbon storage area, explosives bay and storage room for hazardous chemicals will take place within the logistics footprint, comprising of:
  - Fuel storage area comprised of 2 tanks x 45m^3 is 90m^3.
  - Volume of hazardous chemicals with 3-month stock stored on site will not exceed 80m^3:
    - Xanthate storage of 24.072m^3;
    - Dow Frother is storage of 27.582m^3.
  - Explosives capacity not provided but a 7-day supply is the normal volume for storage.
- Establishment of Processing Plant Site at the Rietberg Mine that will include the processing plant, a metallurgical and assay laboratory, offices, reagent storage facility and a workshop.
- Establishment of a RoM stockpile with a process plant feed at Rietberg, and mining portals as shown on **Diagrams 3b, 3c** and **3d**.
- Establishment of areas for Waste Rock Dumps (WRDs) on existing historical waste rock dumps.
- Construction of Tailings Storage Facility (TSF) and associated infrastructure.

3.3.2 Operational Phase

The selected underground mining method will be Sub Level Open Stoping (SLOS) as described in Section 3.2.2 and illustrated in **Diagram 2**. This method was selected based on the following criteria:

- Orebody Dip (70 Degrees)
- Orebody Continuation on Strike (No Continuation on Upper Orebody (pillars) and very Scattered for Lower Orebody)
- Minimise Development Requirements

Footwall Drives will be developed from the declines. These Footwall drives will be positioned 15m below the reef horizon as per Geotechnical recommendations. Reef Drives will then be developed from the Footwall drives at 25m spacing to the bottom of each stope, thus intersecting each stope in the middle.
The portion of the reef drive between the Footwall Drive and Stope will be off-reef, whereas all development in the stope will be on-reef. The on-reef portion will be developed to the end of the stope (Hanging wall Contact). A slot raise will then be blasted from the end of the on-reef drive upwards to the top limit of the stope. This will create a free face for ring blasting.
The stopes will be mined in a retreat fashion from the top stopes to the bottom stopes. Diagram 2 illustrates the typical retreat mining strategy. This same method will apply to the pillar/skins mining in the Upper Orebody, with the only difference that very few stopes will be dependent on stopes above it. Where possible the blasted material from the skins will fall directly into the existing mining void for extraction at the existing draw points.

The **primary processing activities** include:

- Crushing and screening;
- Milling Circuit
- Reagent Make-up and conditioning
- Flotation circuit; and,
- Product Handling

As detailed in Section 3.3.7 above the Processing Plant is illustrated in the Plant Flowsheet (**Diagram 5**) and incorporates a conventional two stage crushing circuit with a primary jaw crusher followed by a secondary cone crusher in closed circuit with a vibrating screen. The primary mill discharge is pumped through a cyclone with the underflow passing through a flash flotation cell before gravitating to the secondary milling circuit. The cyclone overflow streams from the primary and secondary milling circuits form the feed to the flotation circuit. The flotation circuit comprises rougher, cleaner and re-cleaner tank flotation cells. The rougher concentrate is pumped to the cleaner cells with that concentrate progressing to the re-cleaner stage. The tailings from each stage are returned to the previous stage with the rougher tailings passing through a scavenger stage. The re-cleaner concentrate is the final concentrate which is filtered to and stored prior to export. The scavenger tailings will be thickened to 60% solids before being pumped to the tailings dam. The concentrate, equating to 10% of the original plant feed mass, will be sold at the mine gate.

3.3.3 Decommissioning Phase

Planning for closure and restoration from the beginning of an operation makes the process easier; waste can be removed as it is created, excavation can be planned so that topography restoration is less complicated, and topsoil soil can be re-used at shorter intervals. The decommissioning and closure phase at the end of the life of the mine will consist of implementing the final rehabilitation, decommissioning and closure plan (**Appendix G**).

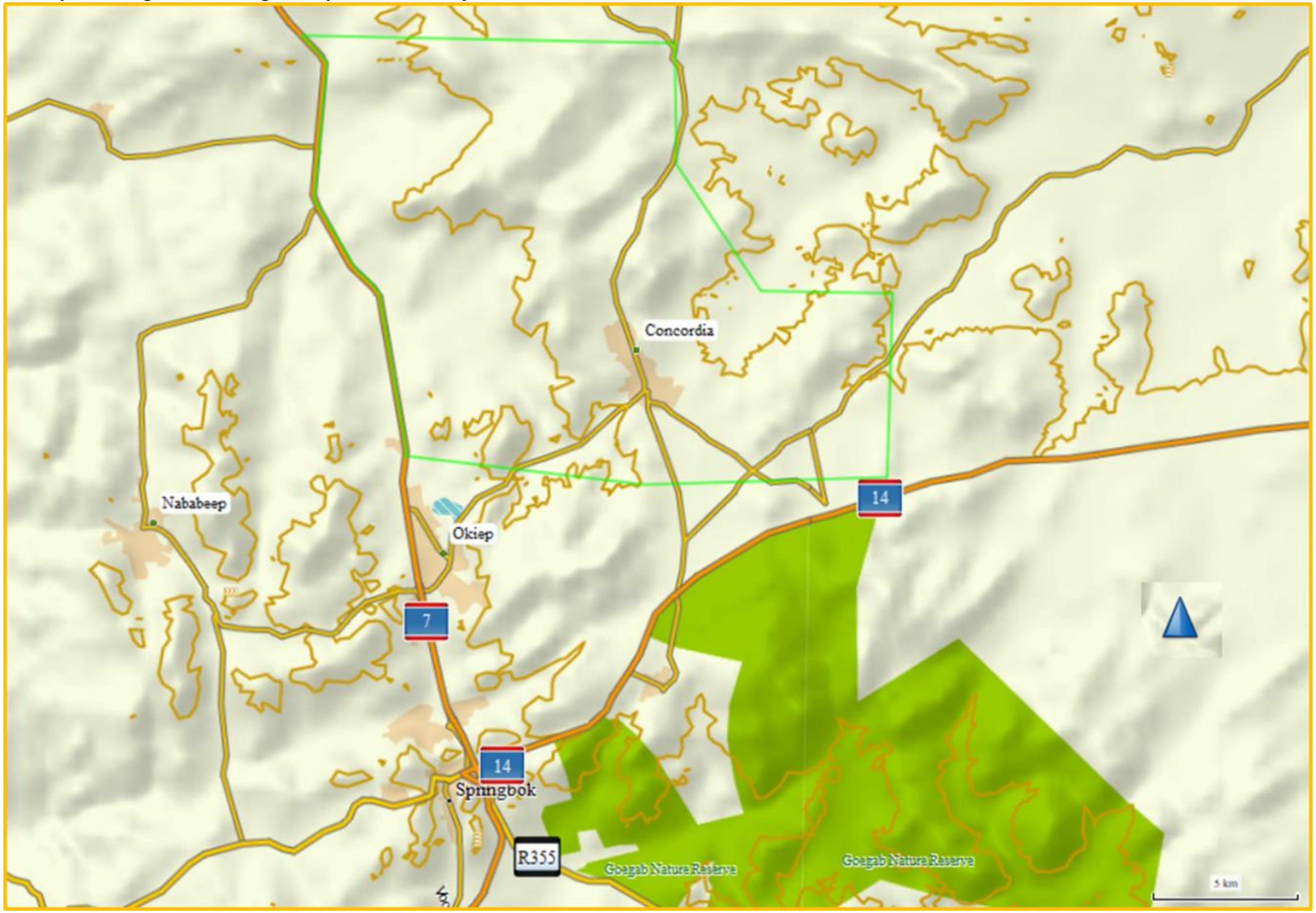
As included in Section 3.3.12 above, activities undertaken during this final project phase include:

- Removal of all structures and infrastructure not to be retained by the landowner in terms of section 44 of the MPRDA.
- All fixed assets that can be profitably removed will be removed for salvage or resale.
- Any item that has no salvage value to the mine, but could be of value to individuals, will be sold and the remaining treated as waste and removed from site.
- All structures will be demolished and terracing, and foundations removed to the lesser of 500 mm below the original ground level.
- Inert waste, which is more than 500 mm underground, such as pipes, will be left in place
- A hazardous disposal site will not be constructed, and all hazardous waste will be removed from site and transported to the nearest licensed facility.
- All services related to the mining operation, water supply lines and storage on site will be demolished.
- Existing tracks will be used, and no new roads will be developed during this phase.

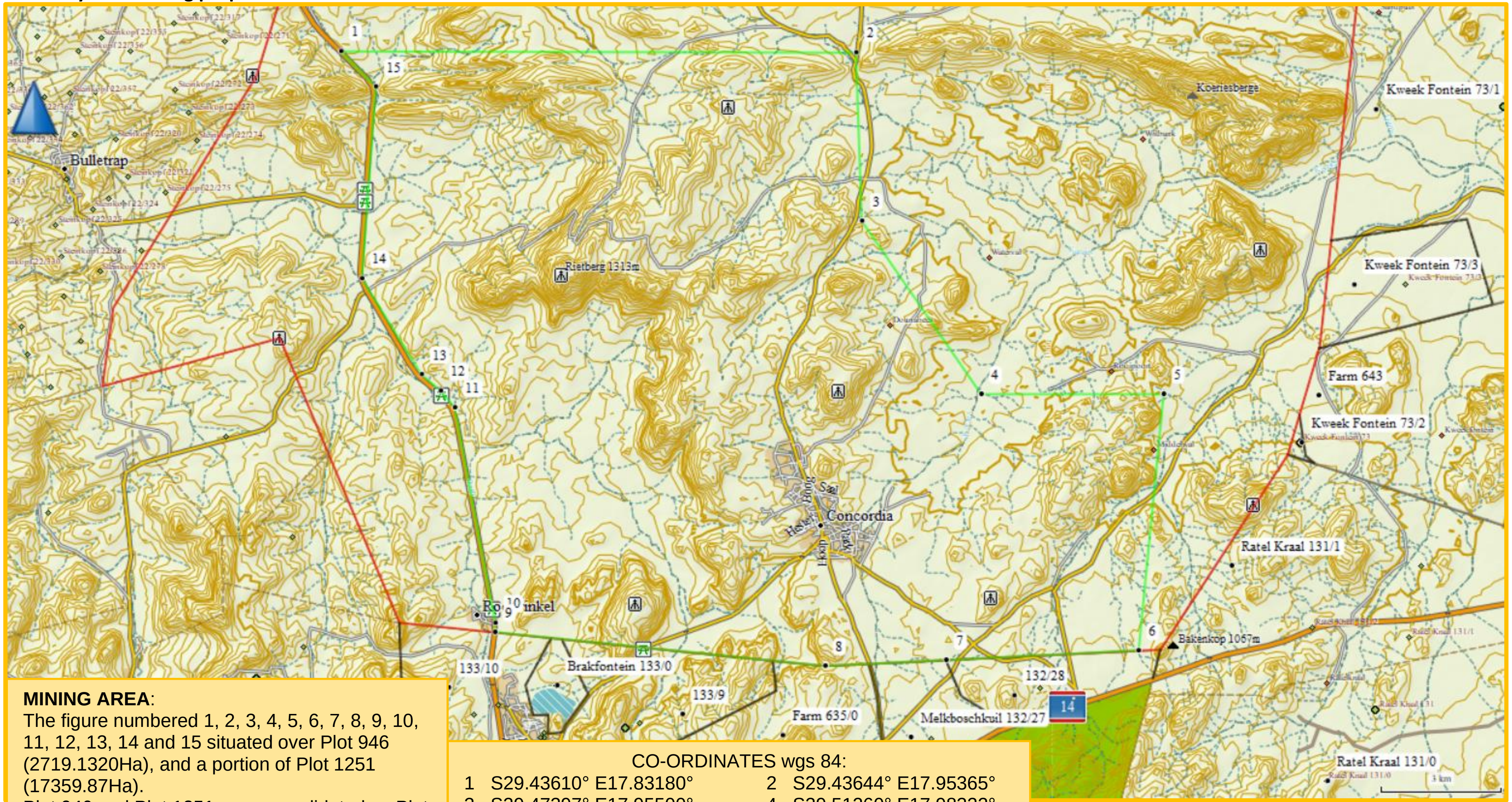
- The TSF and development areas will not exceed the planned footprint. Recommendations for the decommissioning, closure and rehabilitation of the TSF have been provided in the Specialist Report by Epoch Resources (Pty) Ltd (**Appendix D**) in accordance with the “Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation” in GNR 632 of 24 July 2015 (in GG No. 39020).
- The post-mining pit stability and waste dump profiles will be addressed as part of the operation and necessary remedial actions implemented prior to closure.

3.4 Locality maps with boundary coordinates and ore bodies

Locality of mining area showing nearby Towns and Major routes



Mine Layout showing properties and co-ordinates



MINING AREA:
The figure numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15 situated over Plot 946 (2719.1320Ha), and a portion of Plot 1251 (17359.87Ha).
Plot 946 and Plot 1251 now consolidated as Plot 2100 Concordia Township
Total Extend 20 079 Ha
District: Namaqualand

CO-ORDINATES wgs 84:

1 S29.43610° E17.83180°	2 S29.43644° E17.95365°
3 S29.47397° E17.95500°	4 S29.51260° E17.98322°
5 S29.51262° E18.02636°	6 S29.56954° E18.02565°
7 S29.57189° E17.97489°	8 S29.57317° E17.94628°
9 S29.56561° E17.86816°	10 S29.56358° E17.86824°
11 S29.51556° E17.85868°	12 S29.51182° E17.85536°
13 S29.50812° E17.85083°	14 S29.48676° E17.83674°
15 S29.44398° E17.84003°	

Mine Landscape showing mineral resource location

3.5 Environmental Authorisation (EMPr) requirements

The key closure objective described in the plans submitted as part of the EMPr is to ensure that the affected environment is maintained in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof. The aesthetic value of the area will also be reinstated.

The main closure objective is to leave the site in as safe and self-sustaining a condition as possible and in a situation where no post-closure intervention is required. This key closure objective is divided in three closure objectives as stated below with their supported suite of key mitigating activities.

The objectives to meet the set goals as applied to the final decommissioning and mine closure can be summarised as follow:

- **Objective 1 - To create a safe and healthy post-mining environment**
  - Safe excavations
    - Slope stability of remaining excavation
    - No potentially dangerous areas secured if required
  - Limited residual environmental impact
    - Rehabilitate the Tailings Storage Facility as per the Recommendations in Appendix D.
    - Develop a landscape that reduces the requirement for long term monitoring and management
    - No surface and/or groundwater contamination
    - Waste management practices not creating or leaving legacies

- **Objective 2 - To create a stable, free draining post mining landform, which is compatible with the surrounding landscape**
  - Economically viable and sustainable land, as close as possible to its natural state.
    - Prepare area to promote natural re-establishment of vegetation that is self-sustaining, perpetual and provides a sustainable habitat for local fauna and successive flora species
    - Prevent long term changes in land use by implementing prompt rehabilitation and maintenance of disturbances when possible as part of annual rehabilitation plan.
  - Stable, free draining post mining landform
    - Prevent alteration or diverting natural drainage lines and reduced natural runoff.
    - Prevent concentration of runoff, mixing of clean runoff with contaminated runoff and creation of large open water bodies.

- Objective 3 – To provide optimal post-mining social opportunities
  - Optimised benefits for the social environment
    - Positive and transparent relationships with stakeholders and maintaining communication channels, providing stakeholders including government authorities with relevant information as per legislative requirements.
    - Undertaking environmental management according to approved EMPr and Closure plans and regular auditing of the environmental management system.
  - Minimal negative aesthetic impact
    - Mitigate the nuisance effects of air emissions (dust), visual intrusion and the cumulative effect of a raise in the ambient noise levels
    - Prevent disturbance of archaeological sites and implement mitigating measures according to the archeological assessment.

Concurrent or progressive rehabilitation of disturbed areas is good practice and should be undertaken as this offers a number of advantages such as limiting the mine's environmental liability and limiting costs at closure as rehabilitation is included in the operational activities of the mine.
Rehabilitation measures to be implemented include improving the visual appearance of the disturbed areas, establishing a cover to provide erosion control, improving runoff water quality by minimising silt loads and controlling dust.

Concurrent rehabilitation and remediation are provided for in the annual rehabilitation plan and contain information that defines activities on an annual basis and how these relate to the Final closure vision, as detailed in this final rehabilitation, decommissioning and mine closure plan.
Annual reviews in terms of regulations 6(a) and 11(1)(a) of the NEMA Financial Regulations, that form part of the Annual Environmental Audit, assesses what closure objectives and criteria are being achieved through the implementation of the plan.

While some disturbed areas can be rehabilitated on a progressive basis during operation, others cannot be rehabilitated until mining is complete. For this reason, some rehabilitation is generally still required during and after closure. Remedial initiatives to minimize environmental impact during and after mining can be divided into three main categories:

- Firstly, the removal of surface infrastructure that cannot be used for other purposes.
- Secondly, the remediation and rehabilitation of old pits to remove the hazard they present to people and animals. Earthworks and contouring the mine area to as close as possible to the pre-mining landscape. This includes filling pits, trenches and small excavations; making pit side's safe and covering the surface area with subsoil and topsoil as necessary; and mitigation or restoration of all surface disturbances and revegetation of the pit slopes and waste rock dumps.
- Lastly, the removal and isolation of potential pollutants from the environment. Containment and treatment of contaminated water and correct storage and removal of hazardous materials. Waste rock present specific problems, as they are unsuitable for other uses. For this reason, all waste rock and even low-grade product produced are destined to remain in the environment.

The aims of rehabilitation should therefore look at limiting the long-term liabilities that will be borne by future generations. Where possible, natural systems will be used to control water pollution and vegetation cover should limit windblown dust pollution. Gradients will be reduced to levels where erosion is minimal, and natural revegetation is possible.

Maintenance of rehabilitated sites is often the difference between the ultimate successes or failure of rehabilitation and monitoring of rehabilitation will determine whether rehabilitation objectives and requirements are being achieved.
As the final phase in the project cycle, decommissioning may present positive environmental opportunities associated with the return of the land for alternative use and the cessation of impacts associated with operational activities.
Depending on the nature of the operational activity, the need to manage risks and potential residual impacts may remain well after operations have ceased. Examples of potential residual impacts and risks include erosion, slow recovery of vegetation, stock that has been abandoned (e.g. oil drums, scrap equipment) and old (unserviceable) structures.
The main closure objective is to hand back the rehabilitated properties in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof. The aim therefore is to leave the site in as safe and self-sustaining a condition as possible and in a situation where no post-closure intervention is required. Aftercare and maintenance required can only be identified post decommissioning and depending on success of rehabilitation and mitigating measures.

3.5.1 Infrastructure and Logistics areas

The main post closure objective for the infrastructure areas is to leave the site in as safe and self-sustaining a condition as possible and in a situation where no post-closure intervention is required. The aim is to ensure that the affected environment is maintained in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof. The aesthetic value of the area will also be reinstated.
The general approach adopted is the complete removal of all infrastructure and equipment and to reuse all infrastructures and equipment at another location by the company. Redundant structures, buildings and civil foundations (down to one meter below surface for subsurface infrastructure) will be removed for use elsewhere or demolished and discarded. All steel structures and reinforcing will be discarded or sold as scrap. Building rubble will be buried together with any remaining waste blocks. The compacted salvage yard, lay down and movement areas will be screened for petrochemical spills and cleaned before it is ripped and leveled. All redundant water pipes, pumps, power lines and cable associated with raw water and electrical supply will be removed. Service roads needs to be maintained and handed over to the landowner in a good state of repair and all redundant fences needs to be removed. All temporary waste storage areas need to be cleaned out and waste removed. Waste material of

any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the complete area and disposed of at a recognised landfill facility. It will not be buried or burned on the site.

3.5.2 Tailings Storage Facility

Refer to **Appendix D** (attached to Draft EIA Report).

3.5.3 Waste Rock Dumps

Underground mining operations commonly have a permanent impact on rock masses that influences the geology below round and the topography on the site and can impact post-mining slope stability.
The waste rock is to be dumped away from the processing area at the designated waste rock dump. Post mining topography for most of the area will follow the original landform shape except where changes due to the waste rock dump have occurred.
The main objective is usually to landscape the waste rock dump. The post closure objective will be to restore the land to its pre-mining carrying capacity for stock farming taking into account the altered landform on the mining area due to mining activities and the absence of natural vegetation on the granite domes. Re-vegetation of disturbed areas will follow a process of natural plant succession starting with pioneer plants.
The main closure objective therefore is to leave the site in as safe and self-sustaining a condition as possible and in a situation where no post-closure intervention is required. The aim is to ensure that the affected environment is maintained in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof. The aesthetic value of the area will also be reinstated.

The basic rehabilitation methodology will therefore strive to replicate the pre-mining topography, wherever possible, or at least not to increase overall slope gradients without emplacement of adequately designed erosion control or runoff diversion structures.

4 RISK SOURCES AND IDENTIFICATION

4.1 Risk sources

4.1.1 Infrastructure and Logistics areas

- Access and Haul Roads
  - Access to and from the mine workings use public road systems and existing tracks.
  - Existing tracks will be used as haul roads and will upgraded to facilitate haul trucks.
- Services and associated infrastructure
  - Process water is to be obtained from the dewatering of the mine shafts, and potentially from off-site sources such as treated water from the O'Kiep open pit.
  - Potable water is to be sourced from the Henkries water supply line to supply the Rietberg Mine.
  - Electrical supply is to be obtained from an Eskom supply, and investigations have been started in this regard.
- Accommodation and Logistics
  - Development and upgrading of infrastructure and waste management facilities are still in progress.
  - No steel or reinforced concrete buildings and structures are present on the mining area that will require demolition.
  - All waste rock structures used as part of accommodation, site office and secure storage needs to be demolish and waste blocks buried together with any remaining cement floors or footings.
  - Structures in the form of pre-fabricated buildings including the fuel tank that can be re-used on another location must be removed from site
  - The cement structures for the fuel supply including service aprons needs to be demolished together with any remaining cement floors or footings.
- Waste management facilities
  - As part of waste management facilities, a salvage yard, laydown area with parking and temporary waste storage facilities will be provided.
  - Domestic waste is to be collected in plastic containers and transported off site on a weekly basis to the local municipal landfill.

  - Petrochemical and hazardous waste including contaminated/used spares, filters and used oil are collected and stored in special containers with spill containment measures for disposal at a registered disposal site.
  - The workshop area needs to be upgraded with a temporary waste storage area, bio cell and laydown area
  - Domestic waste is collected in plastic containers and transported weekly to the local landfill.
  - Petrochemical and hazardous waste including contaminated/used spares, filters and used oil are collected and stored in special containers with spill containment measures for disposal at a registered disposal site.
- Oil/grease/diesel management systems
  - The service and wash bay at the Rietberg mine will be used.
  - The fuel supply tank is to be trucked onto the site for the generators and equipment.
  - The fuel truck must be provided with a parking area with spill containment measures.
  - The generators must be supplied with generator bays with spill containment measures.

4.2 Risk Identification

The potential risks arising from the SHIP mining operation are listed below. The impact rating of applicable risks and mitigation actions are addressed in the risk assessment section below.

4.2.1 Potential Risks with regard to safe excavations and changes in topography

- Potentially dangerous areas like deep mine pits or equipment left behind and uncontrolled access to a potentially unsafe post-mining area
- Post mining topography not compatible with original landform.
- Unsafe erosion gullies.

4.2.2 Potential Risk of residual environmental impact/waste

- Post mining landscape that increases the requirement for long term monitoring and management.
- Unwanted ruins, buildings, foundations, footings and waste management practices creating or leaving legacies.
- Sub-surface infrastructure remaining behind, limiting the intended post closure land use including footings and foundations and power supply and water installations including pumps and pipelines.
- Equipment and other items used during the mining operation left behind.
- Incomplete removal of re-usable infrastructure.
- Rubble from demolished infrastructure left behind.
- Waste classes not kept in separate streams and incomplete removal of waste
- Large volumes of large blocks and boulder rubble that requires large dumping areas.
- Creation of waste rock residue deposits or stockpiles with infiltration of leachate due to inadequate basal sealing or leakage from sealed pollution control facilities.
- Stockpiles and leftover product left behind
- Increased erosion, dust generation and potential chemical contaminants reduce surface water quality or result in discharge that exceeds the maximum concentrations permitted.
- Vehicle wash bays and workshop facilities produce petrochemical and solvent contaminated runoff.
- Sanitary conveniences, fuel depots or storage facilities of potentially polluting substances can contaminate surface water.
- Oil fuel leaks onto virgin soil through the earthmoving and transport equipment and machinery or spillage of fuel during transfer from fuel bowser to equipment in the field.
- Inadequate capping or sealing of the boreholes – can lead to infiltration of potentially contaminated surface water leading to chemical or biological contamination of groundwater.
- Drainage of benches and concentration of rainfall leads to creation of large volume open water bodies in worked out pit and can lead to increased groundwater recharge and potential regional impact of low quality water.
- Pumping of process water from the pit sump can discharge poor quality water exceeding minimum standards.

4.2.3 Potential Risks with regard to viable and sustainable land

With mines disruption of the surface occurs, which affects the soil, fauna, flora and surface water, thereby influencing all types of land use. Mining and related infrastructure can be a permanent destruction and rehabilitation cannot restore all pre-mining habitats. Risks associated with economically viable and sustainable land include:

- Uncontrolled expansion of mining footprint by not restricting the area disturbed by mining and the associated activities/infrastructure - loss of land with agricultural potential. Uncontrolled development of roads - existing farm roads not used for mining operations and redundant internal roads left behind. Duel used roads still needed by the landowner and fences not maintained or repaired.
- Post mining landform not compatible with the surrounding landscape and not capable of a productive land use that achieves a land capability equal to that of pre mining conditions
- Long term changes in land use caused by not implementing prompt rehabilitation and maintenance of disturbances when possible as part of annual rehabilitation plan.
- Unsuccessful rehabilitation can reduce the post-mining land use options. Rehabilitated areas could be too unstable to support post-mining land use objectives compatible with surrounding areas.
- Disturbance of agricultural potential and subdivision of high potential arable land into uneconomic farming units. Inadequate planning or loose development can subdivide high potential land or habitats into un-viable small areas.
- Disturbance of ecology due to loss of habitat and cumulative impact of illegal collecting or land use during long-term or life of mine can degrade areas and reduce the viability of adjacent areas. Inadequate control of alien species can result in establishment of populations or seed sources that threaten adjacent areas.

4.2.4 Potential Risks with regard to stable, free draining post mining landform

Increased runoff and altered storm hydrograph impacts on areas downstream or downslope where the flow is concentrated.

- Impact on surface water through modification of infiltration rates by increasing the extent of hardened surfaces.
- Inadequate topsoil restoration or creation of unnatural surface topography or slope form which could impact lower or adjacent slopes due to increased runoff velocity.
- Altered storm water runoff response due to large impervious areas and concentrated runoff in drainage systems. Concentrated storm runoff from infrastructure areas can be erosive, causing sheet, rill and donga erosion features.
- River diversions also change the overall gradient and therefore the flow rates, and impact flood discharge and erosion/sedimentation patterns at the site and downstream.

4.2.5 Potential Risks with regard to benefits for the social environment

- No positive and transparent relationships with stakeholders and not maintaining communication channels – not providing stakeholders including government authorities with relevant information as per legislative requirements.
- Not undertaking environmental management according to approved EMP and plans and no auditing of the environmental management system.
- Disturbance to sensitive environments such as land with historical or conservation value, urban areas, wetlands or rivers, high potential agricultural land, transport infrastructure, power transmission lines. Slow continuous damage to habitat e.g. wood collection is a typical impact on adjacent areas.
- Staff losing their jobs - mine closure can have devastating effects on communities that are reliant on mine-based income Job losses of secondary industries, businesses and contractor’s contractual agreements with service providers surpassing mine closure date
- Closure standards not accepted and/or are changing. Mine closure being jeopardised by other land uses.
- Poorly defined transition from mining to farming activities within different legislation.
- Mine closure stalled due to non-compliance with South African legislation (national, provincial and local).
- Insufficient funds for complete rehabilitation.

4.2.6 Potential Risks with regard to aesthetic impact

Terrain morphology plays a critical role in defining the visual envelope of mining developments and can either reduce or enhance visual impact. Apart from visual intrusion there is also the risk of reduced sense of place. Visual intrusion impact of mining activity on nearby roads, homesteads, settlements and tourist sites.

- Visual disturbance from the public road views – excavations or overburden dumps blocking the view. Large buildings, color contrast of disturbed areas against adjacent veld or dust emission plumes
- Nuisance effects of air emissions (dust) no implementation and maintenance of dust monitoring programs accompanied by dust suppression activities if required.

- Accumulation of spoils from rock saws (fines) can expose highly erodible fine sediment to wind transport and lead to dust generation and dispersal. Dust can retard vegetation growth and reduce the palatability of vegetation.
- Dust generated on haul roads reduces visibility in opencast pit, representing a safety hazard.
- The cumulative effect of a raise in the ambient noise levels or high noise levels in specific areas that exceed specified levels. Noise disturbance and light pollution as a result of night activities.

4.2.7 Potential risks with regard to archaeological sites, cultural heritage sites or graves

Disturbance of archaeological sites by not implementing the mitigating measures where relevant according to the archeological assessment. Progressive development can encroach upon or disturb archaeological sites, cultural heritage sites or graves.

5 RISK ASSESSMENT

5.1 Risk impact rating

Each impact or risk is assessed in terms of: nature (character status); extent (spatial scale); duration (time scale); probability (likelihood) of occurring; reversibility of the impact; the degree to which the impact may cause irreplaceable loss of resources; the significance (size or magnitude scale) prior to mitigation; the degree to which the impact can be mitigated; and, the significance (size or magnitude scale) after mitigation as per the criteria in Table 1 below.

Table 1: Impact Assessment Criteria

ASSESSMENT CRITERIA	
NATURE	
Positive	Beneficial to the receiving environment
Negative	Harmful to the receiving environment
Neutral	Neither beneficial or harmful
EXTENT (GEOGRAPHICAL)	
Site	The impact will only affect the site
Local/ district	Will affect the local area or district
Province/region	Will affect the entire province or region
International and National	Will affect the entire country
CONSEQUENCE	
Loss/gain	The impact will result in loss or gain of resource
No loss/gain	The impact will result in no loss or no gain of resource
DURATION	
Construction period / Short term	Up to 3 years
Medium term	Up to 6 years after construction
Long term	More than 6 years after construction
PROBABILITY	
Definite	Impact will certainly occur (>75% probability of occurring)
Probable	Impact likely to occur (50 – 75% probability of occurring)
Possible	Impact may occur (25 – 50% probability of occurring)
Unlikely	Impact unlikely to occur (0 – 25% probability of occurring)
REVERSIBILITY	
Reversible	Impacts can be reversed though the implementation of mitigation measures
Irreversible	Impacts are permanent and can't be reversed by the implementation of mitigation measures
IRREPLACEABLE LOSS OF RESOURCES	
High	The impact is result in a complete loss of all resources
Medium	The impact will result in significant loss of resources
Low	The impact will result in marginal loss of resources
No Loss	The impact will not result in the loss of any resources
CUMULATIVE EFFECTS	
High	The impact would result in significant cumulative effects
Medium	The impact would result in moderate cumulative effects
Low	The impact would result in minor cumulative effects
SIGNIFICANCE RATINGS	
Very High	Major to permanent environmental change with extreme social importance.
High	Long term environmental change with great social importance.
Medium	Medium to long term environmental change with fair social importance.
Low	Short to medium term environmental change with little social importance.
Very low	Short-term environmental change with no social importance
None	No environmental change
Unknown	Due to lack of information
DEGREE TO WHICH IMPACT COULD BE AVOIDED/MANAGED/MITIGATED	
High	The impact could be significantly avoided/managed/mitigated.
Medium	The impact could be fairly avoided/managed/mitigated.
Low	The impact could be avoided/managed/mitigated to a limited degree.
Very Low	The impact could not be avoided/managed/mitigated; there are no mitigation measures that would prevent the impact from occurring.

5.2 Risk Mitigation and Closure objectives

In addition to the goals and objectives for final decommissioning and mine closure the vision for the post closure land form is to leave the site in as safe and self-sustaining a condition as possible and in a situation where no post-closure intervention is required. The vision is to ensure that the affected environment is maintained in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof and that the aesthetic value of the area will be reinstated.

For the vision to be realised the objectives and associated risk management strategies and mitigating measures for the operational phase described in Table 1 below needs to implemented, monitored and evaluated.

The aim with risk mitigation actions is to over time manage significant and medium risks to become insignificant, or at least medium and under control with management actions. Once achieved, a risk will continue to be monitored to confirm its insignificance rating as part of aftercare and maintenance.

The closure process involves a series of actions, executed over a number of years as indicated in the annual closure plans, with continual monitoring, review and remedial actions (if required). Identified and assessed risks feed into mitigation actions (or primary tasks) of which successful implementation result in achievement of the mine closure goals and objectives.

Financial provision is made in section 6 to deal with these mitigating measures in case of temporary closure or sudden closure during the normal operation of the project or at final planned closure.

The identified risks and their levels are listed together with their associated mitigating actions for the operational phase in Table 2 below.

Table 2: Risks/impacts and mitigating actions: Construction, Operational, Decommissioning and Post-Closure Phase

ACTIVITIES	PHASE	MITIGATION MEASURES
SITE ACCESS & SITE ESTABLISHMENT	**CONSTRUCTION**	**Impact 1: Soil erosion & soil compaction** • After clearing, the affected area shall be stabilized to prevent any erosion or sediment runoff. Stabilized areas shall be demarcated accordingly. • Incremental clearing of ground cover should take place to avoid unnecessary exposed surfaces. • Reasonable measures must be undertaken to ensure that any exposed areas are adequately protected against the wind and stormwater run-off. • Topsoil shall be removed separately and stockpiled separately from other soil base layers. • Stockpiles should ideally be located to create the least visual impact and must be maintained to avoid erosion of the material. • Topsoil storage areas must be convex and should not exceed 2m in height. • Topsoil must be treated with care, must not be buried or in any other way be rendered unsuitable for further use (e.g. by mixing with spoil) and precautions must be taken to prevent unnecessary handling and compaction. • In particular, topsoil must not be subject to compaction greater than 1 500 kg/m² and must not be pushed by a bulldozer for more than 50 metres. Trucks may not be driven over the stockpiles. • Reduce drop height of material to a minimum. • Temporarily halt material handling in windy conditions. • A speed limit of 30km/hour will be displayed and enforced through a fining system. All vehicle drivers using the access road and entering the site will be informed of the speed limit. • Compacted areas that are not required for access shall be scarified after use during decommissioning and rehabilitation.
		Impact 2.1 : Surface Water Resources **Generic mitigation measures for surface water resources** • Manage any road widening activities and construction of culverts and pipelines within watercourses and (National Water Act Regulated Area), to prevent an increase in suspended solids, turbidity and pollution from machinery entering the watercourse habitat. • Oils and lubricants must be stored within sealed containment structures. • Any mechanical equipment maintenance must be undertaken on drip trays or UPVC sheets to prevent spills/ leaks onto the soil. • When not in use, a drip tray must be placed beneath mechanical equipment and vehicles. • Machinery must be kept in good working order and regularly inspected for leaks. • A spill kit will be available on each site where mining activities are in progress. • Any spillages will be cleaned up immediately and treated in the bio-cells (soil farms) which are located on the adjacent mine. • Waste materials generated on site must be stored in suitable lidded containers and removed off site to a suitable disposal facility. • Waste separation must be undertaken if practical for recycling • Provide all workers with environmental awareness training and comply with the requirements of the EMPr. • Provide a bin at the site and provide a mobile ablution facility. **Site Specific Mitigation measures** • Plan the location of the processing facility, TSF, waste rock dump and logistics at Rietberg to be outside the active river channel of the ephemeral watercourses wherever possible. • Make use of the existing historical plinths to raise the water pipeline from the Henkries line above the watercourses to reach the Rietberg Mine. • Avoid further impact on the Koeries River (ephemeral watercourse) located to the north of the Jubilee Mine historically impacted on by mine waste rock dumps. • Management of stormwater run-off will be required to keep clean water from entering polluted water systems. • Any watercourse crossings for haul roads will need to be designed to minimise impact on the water resource.

ACTIVITIES	PHASE	MITIGATION MEASURES
		Stormwater management • Ensure that soil erosion berms are placed in locations to prevent stormwater run-off eroding unconsolidated exposed soil. • Ensure that stormwater runoff is not contaminated and can enter watercourses.
		Impact 2.2 Groundwater quality **Groundwater quality mitigation measures during Construction Phase** (**Appendix D**) **Essential** groundwater mitigation measures during construction are as follows: • Take care that onsite sanitation facilities are well maintained and serviced regularly. • Ensure that good housekeeping is implemented and followed. • Ensure that the design of the TSF and WRD complies with GN R632 published in terms of the NEM:WA: the Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits, unless motivation for an alternative design is accepted by the regulatory authorities. • Establish facilities posing a risk to groundwater contamination as far as possible away from known fault zones and perched intergranular aquifers associated with the dry drainage channels of the Koeries River. • Place oil traps under stationary machinery, only re-fuel machines at fuelling station, construct structures to trap fuel spills at fuelling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only. • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials. • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained. **Best practice** groundwater mitigation measures during construction are as follows: • Implement a monitoring system to record the abstraction point's water level and volume abstracted on a regular basis, i.e. at least monthly, preferably weekly; • Monitor water levels at the proposed new monitoring boreholes (see section 9 on page 73 for details) and Rietberg Natural Spring on a regular basis, i.e. at least monthly, preferably weekly; • Collect water samples at the new monitoring boreholes and Rietberg Natural Spring every three months and submit to SANAS accredited laboratories for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH4, Cl, SO4, Total Alkalinity, PO4, F, NO3), TPH, TOC and selected trace-metals (Fe, Al, Se, Cu, Pb, Zn, Cd, As, Sb and U) and microbiology. • Minimise storage of hazardous substances onsite during construction; • Service construction vehicles at a commercial service station if possible; • Maintain vehicles to limit the potential for accidental hydrocarbon spillages; • Encourage contractors to report, react and manage all spills and leaks so that any subsequent spills can be cleaned up immediately to prevent contamination of the groundwater; and • Maintain and service onsite sanitation facilities regularly.
		Impact 2.3 Groundwater quantity Groundwater quality mitigation measures during Construction Phase (**Appendix D**) **Essential** groundwater mitigation measures during construction are as follows: • If boreholes are used to augment construction water supplies, limit abstraction from these to 130 KL/d over an eight hour per day schedule, followed by 16 h recovery, before the next pumping schedule commences. • Implement and follow water saving procedures and methodologies.
		Impact 3: Impact on Biodiversity • Manage any road widening activities and construction of culverts and pipelines within the watercourse and (National Water Act Regulated Area), to prevent an increase in suspended solids, turbidity and pollution from machinery entering the watercourse habitat. • Remove alien invasive vegetation if required and ensure ongoing alien vegetation clearing in the area. • No indigenous plants outside of the demarcated work areas may be damaged.

ACTIVITIES	PHASE	MITIGATION MEASURES
		• The noise and vibration caused by the earthmoving equipment will disturb smaller animals . These will move away whilst operations are in progress. Should any animals be encountered these should be moved away by a suitably trained nature conservation officer, if necessary. • Topsoil is to be stockpiled and replaced during the Decommissioning and Closure Phase.
		Impact 4: Contamination & Pollution • Oils and lubricants must be stored within sealed containment structures. • Any mechanical equipment maintenance must be undertaken on drip trays or UPVC sheets to prevent spills/ leaks onto the soil. • When not in use, a drip tray must be placed beneath mechanical equipment and vehicles. • Machinery must be kept in good working order and regularly inspected for leaks. • A spill kit will be available on each site where mining activities are in progress. • Any spillages will be cleaned up immediately. • Waste materials generated on site must be stored in suitable lidded containers and removed off site to a suitable disposal facility. • Waste separation must be undertaken. • Provide all workers with environmental awareness training. • Provide a bin at the site. • Regularly dispose of any solid waste at a municipal waste disposal site. • Ensure all workers comply with the requirements of the EMPr. Provide mobile ablution facilities.
		Impact 5: Visual landscape • The construction areas shall be kept neat and tidy at all times. Equipment must be kept in designated areas and storing/stockpiling shall be kept orderly. • Place shade cloth around the construction site camp to demarcate the area.
		Impact 6: Emissions • The Applicant shall adhere to the local by-laws and regulations regarding the noise and associated hours of operations. • The Applicant shall limit noise levels (e.g. install and maintain silencers on machinery). The provisions of SANS 1200A Sub clause 4.1 regarding "built-up" area shall apply to all areas within audible distance of residents whether in urban, peri-urban or rural areas. • Construction and demolition activities generating output of 85dB or more, shall be limited to normal working hours and not allowed during weekends to limit the impact of noise of neighbours. No amplified music shall be allowed on site. • Hauling vehicles shall adhere to municipal and provincial traffic regulations including speed limits. • Vehicles used on site for the construction related activities shall be maintained and in a good working condition so as to reduce emissions. • Engines shall be turned off when the vehicle is temporarily parked or stationery for long periods. • Stockpiles must be maintained (covered where necessary) to avoid wind erosion of the material. • Incremental clearing of ground cover should take place to avoid unnecessary exposed surfaces. • Provide lighting to ensure safety standards are met, and direct light away from public areas (such as the public access road). • Ensure workers are supplied with Health and Safety equipment for noise and dust where applicable. • Apply safety standards for blasting.
		Impact 7: Heritage resources • All haul roads must make use of existing roads as far as possible (including where they cross or follow the historic copper mining railway). • All upgrades to haul roads must be centered on the existing roads as far as possible so as to minimize impacts to features located close to these roads. • Any alteration to the overall project footprint (i.e. mine fences and haul road locations) must be subjected to further assessment as may be required. • All surface activities must be contained within the three mine fences to avoid impacts to unsurveyed areas. • The final layout of each of the three mines must be considered by an archaeologist or heritage consultant to determine whether any specific mitigation measures or no-go areas not anticipated in the present assessment might be required prior to construction.

ACTIVITIES	PHASE	MITIGATION MEASURES
		• The graveyard in the Jubilee Mine (Waypoint 111) must be fenced with a 30 m buffer and declared a no-go area. A gate should be provided for potential visitors and to allow cleaning of any wind-blown litter. • The historical stone-built mining-related structures in the Jubilee Mine must be preserved. They can be reused if required but their modification must be approved by SAHRA to ensure that their heritage significance is not diminished (this may require the services of a heritage architect). • The stone house and threshing floor in the Houmeep Mine (Waypoint 163) must be avoided and declared a no-go area. A 30 m buffer should be imposed if possible but this is not required. The structure should not be used for mining-related activities. (This has been demarcated on Figure 3d and is excluded from the mine site boundary.) • All ruins, livestock enclosures and structures related to local herder activity and hence living heritage) must be avoided as far as is possible. • If any herder enclosures or structures will need to be removed or will be covered by mine dumps then this must be done in consultation with their owners (if traceable) or other community members. • If any historical underground mine workings are opened then these must be inspected (insofar as it is safe to do so) for historical traces such as hand tools, mining equipment, graffiti or other features. A report including a photographic record must be submitted to SAHRA for approval prior to modification or destruction of the historical workings. • A chance finds procedure for recording and recovering isolated fossil finds must be incorporated into the environmental management program for the project. (Included as Table 21 in Part B: EMPr of this report). • If any Stone Age, historical or industrial archaeological material (e.g. stone tools, historical rubbish dumps, historic mining equipment or tools) or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.
		Impact 8: Socio-economic • Employment of local previously disadvantaged labour wherever possible, with provision of training (upskilling). • Employment of skilled labour.
Services and associated infrastructure Primary Processing operation Water and wastewater management Waste generation and management Tailings Storage Facility (TDF) Waste rock dumps	**OPERATION**	**Impact 1: Change in Topography** • The waste rock dumps must be designed to meet minimum slope stability and safety standards and vegetated to reduce erosion and runoff. • The “valley fill” natural angle of repose of 37° for rock waste dumps is compatible with the natural rocky terrain with steep slopes and no terracing will be required. • The ongoing management of the self-raising TSF shall be in accordance with the relevant regulations and as per the Definitive Feasibility Design Report contained in **Appendix D**. • The basic rehabilitation methodology will therefore strive to replicate the pre-mining topography, wherever possible, or at least not to increase overall slope gradients without emplacement of adequately designed erosion control or runoff diversion structures.
		Impact 2: Soil erosion & soil compaction • After clearing, the affected area shall be stabilized to prevent any erosion or sediment runoff. Stabilized areas shall be demarcated accordingly. • Incremental clearing of vegetation should take place to avoid unnecessary exposed surfaces. • Reasonable measures must be undertaken to ensure that any exposed areas are adequately protected against the wind and storm water run-off. • Stockpiles should ideally be located to create the least visual impact and must be maintained to avoid erosion of the material. • Reduce drop height of material to a minimum. • Temporarily halt material handling in windy conditions. • A speed limit of 30km/hour will be displayed and enforced through a fining system. All vehicle drivers using the access road and entering the site will be informed of the speed limit. • Compacted areas that are not required for access shall be scarified after use during decommissioning and rehabilitation. • Provision must also be made for efficient storm water control to prevent erosion. • Soil erosion and compaction on the section of public road, should it remain unsurfaced, used by the Applicant is required to be monitored and timeously repaired. • Soil erosion on private haul roads is to be regularly monitored and repaired.
		Impact 3.1: Surface water resources

ACTIVITIES	PHASE	MITIGATION MEASURES
Access roads		• Ensure that an effluent purification (biozone or similar system) and recycling system is installed. • Implement an integrated waste management system on site. • Ensure all hazardous substances are stored correctly. • Ensure stormwater berms divert stormwater away from infrastructure in the mine area. • Adhere to the management of the TSF as per the Definitive Feasibility Study Design report (**Appendix D**) to ensure that this waste disposal facility does not pollute surface water resources, and ensure the ongoing maintenance of the stormwater diversion trenches associated with the TSF. • Ensure all pipelines and powerlines located within close proximity to the water course are maintained and erosion of support structures does not occur to compromise the integrity of the infrastructure, resulting in water pollution or riverbank erosion.
		Impact 3.2 Ground Water Resources Quality Mitigation Measures during Operational Phase (**Appendix D**): **Essential** groundwater mitigation measures during operations are as follows: • Take care that onsite sanitation facilities are well maintained and serviced regularly. • Ensure that the design of the TSF and WRD complies with GN R632 published in terms of the NEM:WA: the Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits, unless motivation for an alternative design is accepted by the regulatory authorities. • Design and construct the RWD and SWD with adequate liners. • Slope the WRD and RoM Stockpiles to prevent rainwater ponding and maximise storm water runoff. • Channel stormwater runoff to the SWD. • Draw-up and strictly enforce procedures for the storage, handling and transport of different waste materials. • Place oil traps under stationary machinery, only re-fuel machines at fuelling station, construct structures to trap fuel spills at fuelling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only. • Draw-up and strictly enforce procedures to handle accidental spillage and leaks on process water pipelines and incorporate adequate leakage detection and spill control measures in the facility's design and construction. • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained. • Ensure that good housekeeping rules are applied, and emergency spill clean-up procedures and equipment are in place. **Best practise groundwater mitigation measures during operation:** • Reduce salinity of groundwater derived process water from mine dewatering and possibly the O'Kiep mine, by blending with better quality water, e.g. less saline treated wastewater from the O'Kiep and/or Concordia Municipal WWTW, or Sedibeng Water's pipeline; • Install a groundwater monitoring system with monitoring boreholes drilled upstream and downstream of facilities where potential groundwater risk is highest, i.e. TSF, RWD, SWD and Treatment Plant. Suggested number of monitoring boreholes are as follows: o TSF and RWD – one upstream and two downstream; and o SWD – one upstream and one downstream. • Install a monitoring borehole upstream and downstream of each mine site to monitor groundwater levels and chemistry in the fractured-rock aquifers; • Monitor groundwater dewatering discharge and water quality at the three SHIP mines, i.e. Rietberg, Jubilee and Homeep; • The groundwater monitoring should include the following: o The water levels at all monitoring boreholes and the three mines must be recorded on at least a monthly basis – best results are obtained if automatic water level recorders set to take hourly readings are installed; o Volumes abstracted must be measured and recorded on at least a monthly basis; o Water samples must be collected at all monitoring boreholes and the three SHIP mines on a three-monthly basis and submitted to a SANAS accredited laboratory for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH4, Cl, SO4, Total Alkalinity, PO4, F, NO3), COD, TPH and selected trace-metals (Fe, Mn, Al, Se, Cu, Pb, Zn, Cd, As, Sb and U); and

ACTIVITIES	PHASE	MITIGATION MEASURES
		o A SACNASP registered hydrogeologist should evaluate the monitoring data on an annual basis and compile a monitoring report. • Minimise storage of hazardous substances onsite during operation.
		Impact 3.3 Ground Water Resources quantity **<u>Mitigation Measures during Operational Phase</u>** (**Appendix E**): **Essential** groundwater mitigation measures during operations are as follows: • Implement and follow water saving procedures and methodologies and use alternative water supply sources. • Replace water supply at the impacted private borehole with an alternative water supply, e.g. municipal.
		Impact 4: Impact on biodiversity • The mining areas and stockpile areas must be demarcated and the footprint contained within the demarcated areas as shown on Diagrams 3b, 3c and 3d. • The annual rehabilitation plan must be implemented. • Correct management of the TSF as per the Definitive Feasibility Design Report (**Appendix D**) will prevent an increase in the development footprint within the CBA2 area at Rietberg Mine • Remove alien invasive vegetation and ensure ongoing alien vegetation clearing should this be required. • No indigenous plants outside of the demarcated work areas may be damaged. • The noise and vibration caused by the earthmoving equipment will disturb smaller animals. These will move away whilst operations are in progress. Should any animals be encountered these should be moved away by a suitably trained nature conservation officer, if necessary.
		Impact 5: Contamination & Pollution • **Waste rock** from the mining process is to be disposed of in the waste rock dumps as shown in **Diagrams 3b, 3c and 3d**. • **Industrial waste (i.e. including hazardous wastes and oils and greases)** - Separation of wastes into classes will ensure that waste is disposed of safely and according to the correct procedure. In order to ensure that waste classes are kept in separate streams, training will be undertaken. - Petrochemical spillages to be collected in a drip tray and drum to store; excavate spill affected soil for disposal at a registered hazardous waste facility. - Hazardous waste is to be disposed of at Vissershoek Landfill. • **Domestic waste (i.e. waste that is generated from the offices)** - Domestic waste - separated at source into recyclable products. These must then be removed and recycled by recognised contractors. (Note that the mine is responsible for the waste from cradle to grave). - Disposal at a registered and officially permitted commercial or municipal landfill site is the most cost-effective option for materials that cannot be recycled. - Domestic waste generated by workers needs to be sorted and all biodegradable waste must be stored in separate drums provided for. • **Tailings Storage Facility (TSF)** - Manage the TSF according to the Definitive Feasibility Study Report (**Appendix D**) to ensure that the waste disposal facility complies with relevant legislation. • **Wastewater** - Equipment used in the mining process will be adequately maintained so that during operations it does not spill oil, diesel, fuel, or hydraulic fluid. - By keeping contaminated and clean water separate and establishing controlled runoff washing bays, the flow and end destination of decontamination washing water will be controlled. - Slow storm water runoff with contoured, low-gradient drains and channels, as well as retention ponds. A series of ponds may also be used to remove sediment and other contaminants from water before reuse or reintroduction into the mining process. - Ensure that a purification and recycling sewage and effluent management system is installed.
		Impact 6: Visual landscape • The site shall be kept neat and tidy at all times. Equipment must be kept in designated areas and storing/stockpiling shall be kept orderly. • Mitigation of the visual impact of "heaped fill dumps" and "sidehill dumps" will include limited topsoil application to the slope and revegetation on the top of the dump. • The visual impact of the TSF will be mitigated during rehabilitation.
		Impact 7: Emissions

ACTIVITIES	PHASE	MITIGATION MEASURES
		• Health and safety equipment are required for workers. • Wetting helps reduce dust generation. • No amplified music should be allowed on site. • Existing tracks will be used as haul roads and will only be upgraded to facilitate haul trucks by applying dust suppression and/or hardening compound such as Macadamite. • On public roads the vehicles shall adhere to municipal and provincial traffic regulations including speed limits. • Vehicles used on site for the construction related activities shall be maintained and in a good working condition so as to reduce emissions. • Engines shall be turned off when the vehicle is temporarily parked or stationery for long periods. • Reduce drop height of material to a minimum. • Temporarily halt material handling in windy conditions. • Provide lighting to ensure safety standards are met, and direct light away from public areas (such as the public access road). • Use energy efficient bulbs that do not attract insects. • Ensure workers are supplied with Health and Safety equipment for noise and dust where applicable. • Apply safety standards for blasting. • Ensure dust suppression on TSF if required.
		Impact 8: Heritage Resources • All haul roads must make use of existing roads as far as possible (including where they cross or follow the historic copper mining railway). • All upgrades to haul roads must be centered on the existing roads as far as possible so as to minimize impacts to features located close to these roads. • Any alteration to the overall project footprint (i.e. mine fences and haul road locations) must be subjected to further assessment as may be required. • All surface activities must be contained within the three mine fences to avoid impacts to unsurveyed areas. • The final layout of each of the three mines must be considered by an archaeologist or heritage consultant to determine whether any specific mitigation measures or no-go areas not anticipated in the present assessment might be required prior to construction. • The graveyard in the Jubilee Mine (Waypoint 111) must be fenced with a 30 m buffer and declared a no-go area. A gate should be provided for potential visitors and to allow cleaning of any wind-blown litter. • The historical stone-built mining-related structures in the Jubilee Mine must be preserved. They can be reused if required but their modification must be approved by SAHRA to ensure that their heritage significance is not diminished (this may require the services of a heritage architect). • The stone house and threshing floor in the Houmeep Mine (Waypoint 163) must be avoided and declared a no-go area. A 30 m buffer should be imposed if possible but this is not required. The structure should not be used for mining-related activities. • All ruins, livestock enclosures and structures related to local herder activity and hence living heritage) must be avoided as far as is possible. • If any herder enclosures or structures will need to be removed or will be covered by mine dumps then this must be done in consultation with their owners (if traceable) or other community members. • If any historical underground mine workings are opened then these must be inspected (insofar as it is safe to do so) for historical traces such as hand tools, mining equipment, graffiti or other features. A report including a photographic record must be submitted to SAHRA for approval prior to modification or destruction of the historical workings. • A chance finds procedure for recording and recovering isolated fossil finds must be incorporated into the environmental management program for the project. (Included as Table 21 in Part B: EMPr of this report). • If any Stone Age, historical or industrial archaeological material (e.g. stone tools, historical rubbish dumps, historic mining equipment or tools) or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.
		Impact 9: Socio-economic • Employment of local previously disadvantaged labour wherever possible, with provision of training (upskilling). • Ongoing maintenance of haul roads used by trucks during the life of the mine.

ACTIVITIES	PHASE	MITIGATION MEASURES
Final Rehabilitation and removal of temporary infrastructure	DECOMMISSIONING	**IMPACT 1: REHABILITATION OF MINED AND CLEARED AREAS** • Implementation of Final Rehabilitation, Decommissioning and Mine Closure Plan (**Appendix G**). • The focus of topographic rehabilitation may not be obvious at the time of mine planning and must be addressed as the mine develops and the Closure Plan must be reviewed periodically for continued relevance in the light of changed mine path or long-term plans. • Compacted areas shall be scarified after use during decommissioning and rehabilitation. • Any stored topsoil shall be spread over the scarified surfaces. • Rehabilitation of the TSF as per **Appendix D,** which includes: − The reclamation of stripped and stockpiled topsoil from the site for use in the rehabilitation and closure process. − The covering of the outer slopes of the TSF with waste rock for the prevention of windblown erosion. − The progressive replacement of topsoil and waste rock to the outer slopes and crests of the various embankments. − Aftercare and maintenance of the site is expected to comprise the repair of localised erosion gulleys and the maintenance of vegetation for a period of 3 to 5 years or until it becomes self-sustaining after completion of the rehabilitation and closure works, therefore minimisng the visual impact on the landscape. • **Other mitigating with regards to residual environmental impact** - Implementing screening as part of the cleaning activities before materials is moved from the mine. - The infrastructure area will be screened for petrochemical spills and cleaned and waste from the temporary storage facility will be removed and the area cleaned. - Unwanted steel, sheet metal and equipment need to be sold or disposed of as scrap metal. Recycling and reusing materials may reduce garbage haul fees or generate income through the sale of scrap metal and old equipment. - All steel structures and reinforcing will be discarded or sold as scrap. - All equipment and other items used during the mining operation needs to be removed from the site. - Used oils / hydrocarbons fuels / liquids are to be collected in sealed containers (stored on concrete slabs) and removed from site for recycling by a reputable company. - All waste in the temporary storage area for used lubrication products and other hazardous chemicals will be disposed of at a collection point from where it will be collected by a waste recycling company. - All temporary waste storage areas need to be cleaned out and waste removed. - Tyres to be return to supplier or a company that uses old tyres for making door mats, shoes, swings, etc. - Batteries to be return to supplier or disposed at a permitted hazardous waste facility. - Fluorescent tubes to be collected in sealed containers (stored on concrete slabs) and removed from site for disposal at a permitted hazardous waste facility. - Chemical containers to be returned to supplier or disposed of at a legal, permitted facility that is capable of disposing of the waste. (DO NOT sell chemical containers to workers or communities). - Laboratory waste (chemicals) - Returned to supplier or disposed of at a permitted facility that is capable of disposing of the waste. - Industrial chemicals (laboratory waste) - Returned to supplier or disposed of at a permitted facility that is capable of disposing of the waste. These liquid wastes cannot be disposed of on the waste dumps. - Redundant structures, buildings and civil foundations (down to one meter below surface for subsurface infrastructure) will be removed for use elsewhere or demolished and discarded. - All redundant infrastructure and services need to be demolished including ruins, buildings, foundations and footings. - Building rubble will be used as backfill in excavations or removed from site in the absence of excavations. - Remove all power and water supply installations not to be retained by landowner in terms of section 44 of the MPRDA. - Removing underground infrastructure to one meter below surface. - Excavations created by removing subsurface infrastructure needs to be filled, levelled and compacted. - Final walk through of complete mining lease area to ensure no mining related waste and of re-usable infrastructure remain on site. • As part of this phase training of personnel in the implementation of the Closure Plan will be done and the implementation of the environmental awareness plan will be an ongoing process.

ACTIVITIES	PHASE	MITIGATION MEASURES
		IMPACT 2: GROUNDWATER Mitigation measures during Decommissioning Phase (**Appendix D**) **Essential** groundwater mitigation measures during decommissioning are as follows: • Take care that onsite sanitation facilities are well maintained and serviced regularly. • Ensure that good housekeeping rules are applied. • Place oil traps under stationary machinery, only re-fuel machines at fuelling station, construct structures to trap fuel spills at fuelling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only. • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials. • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained. • Ensure that good housekeeping rules are applied. • Limit rainwater infiltration by topsoiling and vegetating the TSF. • Continue to collect and return leachate from the under drainage and seepage collection facilities to the RWD until dry. • Maintain RWD until leachate from the under drainage and seepage collection facilities of the TSF are dry before decommissioning the RWD. • Continue with groundwater monitoring. **Best practice** groundwater mitigation measures during decommissioning are as follows: • Maintain the groundwater monitoring system and procedures described in subsection 8.2.3; • The groundwater monitoring should include the following: o The water levels at all monitoring boreholes, wells, spring and the three mines, if possible, must be recorded on at least a three-monthly basis. Best results are obtained if automatic water level recorders set to take hourly readings are installed; o Water samples must be collected at all monitoring boreholes and the three SHIP mines, if possible, on a three-monthly basis and submitted to a SANAS accredited laboratory for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH4, Cl, SO4, Total Alkalinity, PO4, F, NO3), COD, TPH and selected trace-metals (Fe, Mn, Al, Se, Cu, Pb, Zn, Cd, As, Sb and U); and o A SACNASP registered hydrogeologist should evaluate the monitoring data on an annual basis and compile a monitoring report.
Final Rehabilitation and removal of temporary infrastructure	DECOMMISSIONING	**IMPACT 3: EMPLOYMENT OPPORTUNITIES** • Ongoing employment of local previously disadvantaged labour wherever possible to assist with the decommissioning activities.

ACTIVITIES	PHASE	MITIGATION MEASURES
Groundwater monitoring	POST-OPERATIONAL	**IMPACT 1: GROUNDWATER** **<u>Mitigation Measures in Post-Operational Phase</u>** (**Appendix D**) Best practice groundwater mitigation measures during <u>post-operational decommissioning</u> are as follows: • Maintain the groundwater monitoring system and procedures described in subsection 8.2.3 for five years, or as indicated by the regulatory authorities; • Groundwater monitoring should include the following, and the monitoring system detailed in Section 9 of **Appendix E** is required to be adhered to: o The water levels at all monitoring boreholes and the three mines must be recorded on at least a six-monthly basis. Best results are obtained if automatic water level recorders set to take hourly readings are installed; o Water samples must be collected at all monitoring boreholes, wells, Rietberg Natural Spring and the three SHIP mines, if possible, on a six-monthly basis and submitted to a SANAS accredited laboratory for analysis of pH, EC, macro-chemistry (Na, Mg, K, Ca, NH4, Cl, SO4, Total Alkalinity, PO4, F, NO3), TPH, COD and selected trace-metals (Fe, Mn, Al, Se, Cu, Pb, Zn, Cd, As, Sb and U); and o A SACNASP registered hydrogeologist should evaluate the monitoring data on an annual basis and compile a monitoring report.

6 ESTIMATED COST FOR REQUIREMENTS TO FULLY DECOMMISSION THE SITE

With the repeal of Section 41 of the MPRDA (Act 28 of 2002) that requires that the owner of a mine must make financial provision for the remediation of environmental damage, regulations pertaining to the financial provision for prospecting, exploration, mining or production operations under section 44, read with sections 24 of the National Environmental Management Act, 1998 (Act No.107 of 1998) were issued in 2015.

According to regulation 6 an applicant must determine the financial provision through a detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required for— (a) annual rehabilitation, as reflected in an annual rehabilitation plan; (b) final rehabilitation, decommissioning and closure of the prospecting, exploration, mining or production operations at the end of the life of operations, as reflected in a final rehabilitation, decommissioning and mine closure plan; and (c) remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an environmental risk assessment report.

According to regulation 7 the applicant or holder of a right or permit must ensure that the financial provision is, at any given time, equal to the sum of the actual costs of implementing the plans and report contemplated in regulation 6 and regulation 11(1). In terms of regulation 11(1) the holder of a right or permit must ensure that a review is undertaken of the requirements for (a) annual rehabilitation, as reflected in an annual rehabilitation plan; (b) final rehabilitation, decommissioning and closure of the prospecting, exploration, mining or production operations at the end of the life of operations as reflected in a final rehabilitation, decommissioning and mine closure plan; and (c) remediation of latent or residual environmental impacts which may become known in the future, including the pumping and treatment of polluted or extraneous water, as reflected in an environmental risk assessment report.

In terms of regulation 11(2) the holder of a right or permit must, on completion of the actions contemplated in sub regulation (1), ensure that the adequacy of the financial provision is assessed and any adjustments that need to be made to the financial provision are identified within one year of the commencement of the operations authorised in the right or permit; or where the operations has commenced immediately after its financial year end that follows such commencement.
Financial provision in terms of reg. 6(c) are covered by the requirements for the actual costs of implementation of the measures required for final rehabilitation, decommissioning and closure of the mining operations at the end of the life of operations as reflected in this final rehabilitation, decommissioning and mine closure plan in terms of reg. 6(b).

6.1 Calculation of Closure Cost

This calculation is not based on the standard rates provided for calculation of closure cost as the guideline is calculated using assumptions that are far removed from the mining methods or topographical characteristics of the site.

The calculation below is for the environmental costs. The financial guarantee will be prepared according to the NEMA Financial Regulations. This operation is still in the greenfields stage and no itemisation is possible. Only the total estimate is available as indicated in the table below and itemisation will take place as the development continues.

Table of Costs for Final Rehabilitation, Decommissioning and Closure of the Mining Operations

Cost category	Year 1	Year 2	Year 3
Final rehabilitation, decommissioning and closure of the operation at the end of the life of operations, as reflected in a final rehabilitation, decommissioning and mine closure plan. Reg 6(b) NEMA Financial Regulations.	R500 000	R500 000	R1 000 000

7 THE PUBLIC PARTICIPATION PROCESS

7.1 Principles and Objectives

The Public Participation Process (PPP) was designed to fulfil the requirements of legislation applicable to mine closure. It forms an integral component of the mine closure process by affording Interested and Affected Parties (I&AP) the opportunity to identify environmental issues and concerns relating to the proposed closure, which they feel should be addressed. This is consistent with the provisions of the National Environmental Management Act (Act No. 107 of 1998), Section 2(4)(f), which states that "the participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured".

The objective of the mining operation is to develop a working PPP that informs key stakeholders', I&APs and the general public about mine closure objectives and activities during the life of the mine. The PPP was designed to provide sufficient and accessible information to I&APs in an objective manner to assist them to:

- Identify issues of concern, and provide suggestions for enhanced benefits and alternatives associated with mine closure;
- Identify risks not yet identified during the risk assessment exercise;
- Identify risks associated with mine closure and rehabilitation;
- Contribute local knowledge and experience;
- Verify that their issues have been considered;
- Comment on the Risk Assessment and Mine Closure Plan at the time of final decommissioning of the project, including the significance of potential risks that have been identified and associated impacts; and,
- Play an oversight role in the monitoring and evaluation of mine closure.

7.2 Stakeholder Identification and Project Data Base

Existing data bases were used to inform the list of stakeholders. Special consideration was given to ensure that organizations and individuals that had expressed interest in the activities of the operation, and those who are potentially affected by mine closure, were included on the data base. The following are principles which governed the PPP:

- Key stakeholder groups and the general public comprised the target audience in the development of the PPP.
- Providing information to lay people to allow them to contribute to and participate meaningfully in the process.
- Stakeholder participation is most effective when the proponent and the practitioner recognise, acknowledge and validate stakeholder values when designing a PPP (i.e. there should be no underestimation of the technical and professional competence of citizens).
- The recognition that in the current political climate of South Africa, consultation, empowerment and capacity building is particularly important.

The process of involving stakeholders had three main objectives:

- Steps should be taken to ensure that stakeholder input into the project is relevant and representative.
- Stakeholders should be made aware of their objectives and role in the process,
- An efficient communication and feedback mechanism should be developed during the process to ensure that all stakeholders are kept informed of progress.

Stakeholders were drawn from the sectors outlined below:

- National (DHSWS, DMR), Provincial (DENC, DALR) and Local Government (Local and District Municipalities)
- SAHRA
- Industry (commercial farmers)
- Corporations and businesses (service providers to operation)
- Operations staff

8 WAY FORWARD

This final Rehabilitation, Decommissioning and Mine Closure Plan will be reviewed on an annual basis to align such approved financial provision set out in regulations 9 and 11, of the NEMA Financial Regulations. Concurrent rehabilitation and remediation will be provided for in the annual rehabilitation plan and will contain information that defines activities on an annual basis and how these relate to the closure vision, as detailed in this final rehabilitation, decommissioning and mine closure plan.

When final planned closure is applied for the operation will submit a final environmental performance audit report to DMR as lead agent for final perusal with the objective to issue a closure certificate. At that point, the closure process, and associated public participation program, will close.