Appendix 2: Final Rehabilitation, decommissioning and mine closure plan Including Environmental Risk Assessment

Contends

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.

1.1 The annual rehabilitation plan

The annual rehabilitation plan provide for concurrent or progressive rehabilitation 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.

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).

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 with regards 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 fulfill 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:

- Technical assessments which involved the recording of the project activities over the full life cycle of the prospecting operation (including closure) and the consequent potential impacts on the environment (including cumulative impacts). This resulted in the compilation of a draft closure plan that facilitated discussions with the authorities as well as Interested and Affected Parties (I&APs).
- Identification and consultation with the relevant authorities to record their requirements as well as public meetings with 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.

As a result of the consultation and recommendations from the basic assessment report and EMPr completed the company identified three key closure goals for the final closure of the prospecting 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 and which is capable of a productive land use that achieves a land capability equal to that of pre-prospecting conditions
- 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 3 of this report. This report also describes how these objectives are planned to be met and elaborate on the implementation of certain risk mitigation actions (section 5). 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.
This report fulfils the requirements of both the Final Rehabilitation, Decommissioning and Mine Closure Plan and the Environmental Risk Assessment Report required in terms of the NEMA (Act 107 of 1998) regulations and applicable MPRDA (Act No. 28 of 2002) regulations.

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). Lead agent, facilitator of closure inspections and issues the closure certificate,
- Department of Water and Sanitation (DWAS). Lead agent for potential water related issues and signs off on the mine closure certificate. Cancellation of 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 EMPr requirements

The requirement proposed to be included as part of the EMPr is that after prospecting, the site must be rehabilitated to its original land use, stock farming (grazing). The objectives to meet the set goals as applied to the final decommissioning and mine closure is discussed in section 5 and can be summarised as follow:

- Objective 1 - To create a safe and healthy post-mining environment
  - Safe mining area
  - Limited residual environmental impact
- Objective 2 - To create a stable, free draining post mining landform, which is compatible with the surrounding landscape
  - Economically viable and sustainable land fit for grazing, as close as possible to its natural state.
- Objective 3 – To provide optimal post-mining social opportunities
  - Optimised benefits for the social environment
  - Minimal negative aesthetic impact

3.2 Basic rehabilitation methodology

The post closure objective proposed in the EMPr is to restore the land to its pre-prospecting land use for stock farming taking into account the transformed areas due to historic mining aactivities. Re-vegetation of the disturbed areas will follow a process of natural plant succession starting with pioneer plants.
Post prospecting topography for most of the area will follows the original landform shape except where changes due to historic disturbances occurred that will not form part of the

environmental responsibilities of the applicant due to the specific nature of the exploration program that only include limited drilling as the only invasive prospecting activity.
Rehabilitation will take place according to the approved EMPr and Closure Plan and only involve shaping to construct the required profile of the drill sumps and removing of drill spoils. The compacted areas due to drilling platforms will be ripped to promote natural re-vegetation. The operation will not create any overburden or fine residue dumps. No water reticulation will be laid-on to the mine work area(s) either. No processing plant and services will be developed on the prospecting area and no offices and accommodation will be provided onsite that need decommissioning. Roads, access control and fencing will remain as part of agricultural operations.

3.3 Closure Strategy

Concurrent or progressive rehabilitation is good practice and has advantages for the company as it reduces its overall financial exposure. 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.
Areas that are not covered during concurrent rehabilitation as described in the Annual closure plan that require specific intervention as part of this Final rehabilitation, decommissioning and mine closure plan are discussed below.
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. However, 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 to the respective landowners in a state that is fit for grazing, as close as possible to the original carrying capacity. 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 rehabilitation strategy is based on the natural re-vegetation.
The aim of this mine closure 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.

4 RISK ASSESSMENT

4.1 Risk identification & risk sources

The only risk sources within the prospecting area is the remaining drill sumps and platforms. The risks arising from these sources are listed below and the impact rating and mitigation actions of each risk are addressed in the risk assessment.

- No significant risks were recorded
- Medium risks relate to topography, vegetation, soil, visual aspects and air quality.
  - Drill holes not filled or capped creating unsafe areas.

- Drill spoils not removed or erosion sediment polluting water sources
- Drill platforms and compacted areas including drill traverses limiting agricultural potential
- Oil, fuel and lubricant spills during drilling activities
- Waste classes not kept in separate streams
- Farming not viable on disturbed areas
- Higher erodibility of ripped areas at drill platforms

- Insignificant risks relate to noise, surface water and animal life.

4.2 Risk impact rating

Following risk identification, the impact of each risk was evaluated. One way of evaluating the impact of a risk is to determine the probability, severity, frequency and duration of the risk. These are all valuated separately and then combined to produce a risk impact; insignificant (1, green), medium (2, yellow) or significant (3, red). In some instances, the impact of a risk was classified as uncertain due to lack of information.

- Evaluating the probability

The probability of a (detrimental) environmental impact occurring depends on the controls which are in place to prevent or mitigate the impact (for example, monitoring, instructions and procedures, etc.) and the nature of substance which contributes to the impact. Combinations of descriptions for what are considered to be different levels of importance for controls and substances involved can be integrated in the evaluation of the probability of an activity taking place, which can then be assessed.

There are no standard methods of evaluating the probability of occurrence. All methods used rely on some form of subjective judgment and, therefore, agreed criteria have to be used in the evaluation. Values are assigned for the probability of occurrence of the relative strength of the factors involved to each of the criteria. Three evaluation ratings are used, viz. 1 for unlikely, 2 for could be/could happen/unknown, and 3 for definite/has happened/highly likely.

- Evaluating the severity

In evaluating the severity of a potential impact there are various criteria that can be applied to determine the level of risk associated with the consequences of an action occurring. These are the quantity of material/substance released and the probable size of the covered area or possible spread of impact. Combinations of descriptions for what are considered to be different levels of importance for the criteria listed above can be integrated.

Values are assigned for the severity of the relative strength of the factors involved to each of the criteria. Three evaluation ratings are used, viz. 1 for insignificant, 2 cause for no mine closure certificate to be issued/hazard to quality of life/unknown, and 3 for loss of life/permanent environmental impact.

- Evaluating the frequency

When evaluating the frequency of a potential impact any repetitive, continuous or time-linked characteristics of the impacts are taken into account. Values are assigned for the frequency of the factors involved to each of the criteria. Three evaluation ratings are used, viz. 1 for once off, 2 for intermittent, and 3 for ongoing/continuing/usually.

- Evaluating the duration

The duration of a potential impact is based on the duration of the impact should the risk realise, i.e. the duration could be short-term, medium-term, long-term or permanent. Values are assigned for the duration of the factors involved to each of the criteria. Three evaluation ratings are used, viz. 1 for an instant/point in time, 2 for temporary/ intermittent, and 3 for forever.

The final risk evaluation is a combination of the probability, severity, frequency and duration ratings. The risk rating for the different risks in the mine closure process may be determined in each case for a particular impact.
Values are calculated, as a function of the probability, severity, frequency and duration for different risks. The individual scores are added and a risk impact is assigned. The calculated sums of the possible permutations of probability, severity, frequency and duration range from 4 to 12. Combinations with a sum total of 6 and less were rated as insignificant, while those rating 10 and higher were defined as significant. Risks with ratings in between 6 and 10 have medium outcomes. The overall risk is subsequently reduced to three levels:

- Significant rating of 3 (red)
- Medium rating of 2 (yellow)
- Insignificant of 1 (green)

For a risk with a rating of 3 (i.e. significant), strategies are put in place to reduce the risk to 1 (insignificant) or 2 (medium, provided that the risk can be controlled with management actions). To maintain the rating at 1 or 2, monitoring is implemented for a period of time to enable the confirmation of the risk as insignificant or as medium and under control. When all risks have been confirmed as insignificant or medium and under control via management actions, an application will be made to DMR for a mine closure certificate.
Each risk is furthermore assessed for, decommissioning conditions (DC), and post-mining conditions (PM). Where a risk is only applicable to decommissioning (DC) related activities, a rating for the post-mining period is not provided. Most risks have different impacts for the different stages through which mine closure proceeds.

5 RISK MITIGATION AND CLOSURE OBJECTIVES

Internationally, there seem to be three schools of thought:

- "What the affected community wants, the affected community gets" – that is, the key focus is on providing the end product requested by the affected communities, rather than focusing on the previous status quo of the receiving environment
- "Restoration of previous land use capability" – the original thought process in the South African context, because mining often occurs on land with high agricultural potential
- "No net loss of biodiversity" – the focal point in the ICMM/IUCN dialogue sponsored guidelines for mining and biodiversity, and of many mining corporate policies.

The thought process for the closure of this operation is based on the last two. 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.
To meet the objectives the risk management strategies and mitigating measures described below needs to implemented, monitored and evaluated.
Risk management strategies were identified for the potentially significant risks, while data collection and analysis programmes were pursued to evaluate the uncertain risks. The risks and risk ratings for the two stages, DC and PM are summarised in the sections below and included in these sections are the planned actions to mitigate the risk and hence enable reaching the closure objective. The aim with risk mitigation actions is to over time manage significant (red) and medium (yellow) risks to become insignificant (green), or at least medium and under control with management actions. Once achieved, a risk will continue to be monitored to confirm its insignificance rating of green (or 1) medium and controlled rating of yellow (or 2).

The three key mine closure objectives are elaborated on in more detail and in context of the relevant risks below (each of the objectives are supported by several key aims):

- Objective 1 - To create a safe and healthy post-mining environment
  - Safe mining area
    - Maintain affected environment 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.
    - No potentially dangerous areas; secured if required
  - Limited residual environmental impact
    - No surface and/or groundwater contamination
    - Waste management practices not creating or leaving legacies
    - Develop a landscape that reduces the requirement for long term monitoring and management
- Objective 2 - To create a stable, free draining post mining landform, which is compatible with the surrounding landscape
  - Economically viable and sustainable land fit for grazing, as close as possible to its natural state.
    - Improve Land use with an increased production with regard to grazing.
    - Minimise disturbance of ecology due to loss of habitat and noise/visual/dust
    - Minimise risk of erosion from either increased base flow or prospecting operations:
    - Management of air emissions to minimise nuisance effects; implementation of dust suppression activities.
    - Increase of land with agricultural potential: profiling and sloping of remaining drill sumps and removal of all drill spoils and ripping of all compacted areas to facilitate recovery of natural vegetation through colonization by dispersing species.
    - Prevent long term changes in land use: revert back to mainly stock farming.
    - 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
- Objective 3 – To provide optimal post-mining social opportunities
  - Optimised benefits for the social environment
    - Maintain positive and transparent relationships with stakeholders: maintaining communication channels to all stakeholders and forums.
    - Provide stakeholders with relevant information: making all information available to stakeholders and providing information to authorities as per legislative requirements.
    - Undertaking environmental management in accordance with the implementation, maintenance and auditing of an environmental management system.
  - Minimal negative aesthetic impact
    - Maintain affected environment in an improved state containing no foreign debris or other materials.

The legal framework within which all the above lies entails:

- Defining and meeting closure standards.
- Complying with legislation.
- Sufficient financial provision for mine closure activities.
- Monitoring and plan for latent environmental impact.

The closure process involves a series of actions, 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 objectives and aims.
A narrative description is provided for each key objective in the following paragraphs. Risks associated with each closure objectives are discussed with their mitigation actions and believed impact rating at closure. In addition, the closure standard for each key aim is listed and quantified.

5.1 Create a safe and healthy post-mining environment

The objectives of decommissioning a borehole include removing trip/fall hazards, preventing the borehole acting as a conduit, stopping the mixing of water from different aquifers and to stop the wastage of borehole water from the overflow from artesian boreholes.
The risks associated with stability are the formation of erosion gulley's and a collapsing slope of any remaining drill sumps. The risk can be regarded as insignificant given the extremely low rainfall in the area (outside forces) and small size and even slope of any remaining drill sump. The risk will be mitigated by the shaping of the sump and backfilling or capping of drill collars and ripping of compacted areas due to drill platforms to facilitate natural re-vegetation. Furthermore, no drill spoils will remain on site.
Mitigation also include removing of the headworks and casing. This process ensures the well is free from any obstructions that could interfere with the sealing of the borehole itself. The borehole must be filled to restore to its pre-drilled condition. The backfilled borehole should then be capped and sealed (with an impermeable plug, such as clay) to prevent entry of any foreign objects or contaminated water.
As part of ensuring slope stability re-shaping of the drill sump will be done where required and the land-use plan will be to create an even depression and prepare the area for natural re-vegetation by implementing erosion control measures including waterways, drainage lines and storm water infrastructure if necessary.
The mine will not produce any residue that could lead to water contaminated. Should the attenuation measures for prevention of pollution as described be implemented, the effect on surface water will be insignificant. The most important of these is that any oil or fuel leaks caused during operations must be removed immediately with the saturated soil and placed in bags or drums for disposal at a suitable site.
Another potential risk arising from the mining area after mine closure are changes in the quantity of surface water compared to pre-mining quantities that may negatively affect the area. To prevent significant negative effects arising from changes in post-mining surface water quantities, the post-mining topography at the drill platforms will be adjusted where possible to minimise the effect on water flow and increase potential for re-vegetation. Actions to mitigate the risk of erosion will be through implementation of practices such as leaving the profiling contours. Having these actions in place should ensure that there is no negative effect on surface water flow and will assist in achieving the aim of limited residual impact.
In order to ensure that waste classes are kept in separate streams, communication will be passed on and people will be trained on the different waste classes. Separation of wastes into classes will ensure that waste is disposed of safely and according to the correct procedure.
All remaining unsafe areas like drill hole collars needs to be filled or capped to prevent access by humans and animals.
Implementation of the following tasks to manage the risks associated with exploration activities will ensure that waste management practices do not create and/or leave legacies and will limit the residual impact of mine closure. Regular inspections and audits will be used as management system to ensure compliance.

- All equipment and other items used during the exploration operation needs to be removed from the site.
- Waste material of any description, including receptacles, scrap, rubble and tires, will be removed entirely from the prospecting area and disposed of at a recognised landfill facility. It will not be buried or burned on the site.

The above risks and their levels are listed together with their associated mitigating actions in Table 1.

At the time of final closure there will be no significant risks. Only one medium level risks will be present:

- Possible changes in the surface water quantities and flow patterns leading to erosion on the drill platform. When more information becomes available during the post-mining period, appropriate actions will be taken if proved necessary.

Table 1: Risks, risk levels and mitigating actions in terms of a safe post-mining environment

Risk	Risk Rating	Mitigation Actions
Erosion gulley's	Refer to objective 2 productive land use	
Collapsing slope of drill sump	DC	Design stable slopes. Re-shaping slopes to stable conditions following identification of instable areas through observations and regular inspections
	PM	
	PM	
	PM	
Uncontrolled access to a potentially unsafe area	DC	Eliminate unsafe areas in the post-mining area as far as possible by filling or capping of drill collars. Limiting and controlling access while rehabilitation activities are in progress
	PM	
Oil, fuel and lubricant spills during demolition activities	DC	Cleaning as per current approved procedure. Disposal thereof recognized disposal facilities.
	PM-NA	
Drill spoils and erosion sediment polluting water sources	Refer objective 2 productive land use agriculture	
Post-mining surface water quantities are more/less than pre-mining or changed flow patterns.	DC	Create contours on drill sumps. Monitoring through observations and regular inspections. Implementing final topography changes if required
	PM	
Incomplete removal of waste	DC	Final walk through of complete prospecting lease area to ensure no mining related waste remaining on site.
	PM	
Waste classes not kept in separate streams	DC	Communication and training on the importance of separating waste streams
	PM	

Documentation and monitoring results will be provided as objective evidence of achieving the objective of minimum legacies as listed in Table 2. The criteria with the contents of these documents must comply with are also given in this table.

Accurate records of the decommissioning should be kept as proof that decommissioning was undertaken. The records should include the reason for abandonment, measurement of groundwater level prior to backfilling, depth and position of each layer of backfilling and sealing materials, the type and quantity of backfilling and sealing materials used, any changes made to the borehole (e.g. removal of casing) and any problems encountered during the capping procedure. The location of each borehole should be marked on a map.

Table 2: Objective evidence and closure criteria for safe post-mining environment

Closure objective	Document scope	Author	Success criteria (standard)
Slope stability	Inspection of the post-mining prospecting areas with the objective to identify unstable areas and formation of erosion gulley's	Independent EAP	Post-mining area declared stable by DMR mine health and safety
No negative effect on surface water flow and waste management practices do not leave/create legacies	Inspection of the post-mining surface area with the objective to identify erosion due to storm water and sheet flow	Independent EAP	Post-mining area declared stable by DMR
	Assessment of the completeness of removal of mine waste	Independent EAP	Final performance assessment report declares 100% removal of waste and equipment
Secured potentially Dangerous post-mining sites	Inspection of the post-mining surface area with the objective to identify unsafe areas	Independent EAP	Post-mining area declared safe by DMR

5.2 Create a productive land use that achieves a land capability equal or better than pre-mining

The activities and actions associated with achieving a stable, free draining post mining landform, which is compatible with the surrounding landscape and which is capable of a productive land use that achieves a land capability equal to that of pre-mining conditions are discussed below. It is important to note that for the mine to meet the key objective of economically viable and sustainable grazing, it is imperative that its other key objectives, viz. a safe post-mining area with limited residual impacts and optimal post-mining social opportunities are met.

The building block of viable and sustainable small stock production on the disturbed areas created by drilling is the shaping of the slope and ripping of compacted areas. The above soil preparation will be combined with sound management practices through application of the land use principles, guidelines and recommendations with regard to carrying capacity. These actions should mitigate the risks of erosion and inferior agricultural results due to improper farming practices. Any drill spoils remaining must be removed. The concomitant impacts on soil, vegetation, topography and land capability will be addressed through the reshaping of the landscape and the protection of the area until fully re-vegetated

Unnecessary destruction of vegetation should be avoided by ensuring that traffic and personnel movement be restricted to demarcated areas. No traffic should be allowed on the rehabilitated areas.

A summary of the above risks and their mitigation actions is given in Table 3. Also shown in this table is the level of each risk. At the time of final closure there will be no significant risks. There will however be medium level risks:

- The viability and sustainability of agriculture on the rehabilitated and profiled drill platforms will only be proven over time. Once results from a few consecutive surveys are available, the risk level can either be reduced, or actions required to reduce it further, or control the risk will become clear.
- Similar to the preceding risk, erodibility of the surface will need to be monitored over time before the risk level can be reduced with confidence, or mitigation actions will become clear.

Table 3: Risks, risk levels and mitigating actions in terms of the economically viability and sustainability of the rehabilitated land

Risk	Risk Rating	Mitigation Actions
Farming not viable on rehabilitated areas	DC	Shaping of slopes of any remaining drill sumps and creating micro habitats for seed collection with a higher moisture holding capacity suitable to withstand dry year conditions and limit sandblasting of seedlings. This will be followed by monitoring of erosion and re-vegetation and comparison thereof against that of the virgin landscape adjacent to the mined area. Mitigating steps against accelerated erosion and unsuccessful plant succession through patch dynamics if proven necessary.
	PM	
Yields (restoration) are compromised through improper farming practices	DC	Adherence to the recommended stocking rates. Provide for reduced carrying capacity during restoration process. Mitigating steps against accelerated erosion and slow plant recovery if proven necessary by fencing and exclusion of areas from grazing.
	PM	
Higher erodibility of slopes and profiled areas resulting in erosion	DC	This will only be a risk until re-vegetation is successful. Installation of conservative run-off and land-use plan. Create a rough surface to act as contours and prevent overgrazing and trampling due to agricultural activities.
	PM	
Compaction of drill platforms limiting agricultural potential	DC	Rip (30cm deep) and allow to re-seed naturally. Limiting access to rehabilitated areas
	PM	

The documentation which will be submitted as objective evidence of the state of the above risks at the time of closure is listed in Table 4. With the contents of these documents showing compliance with the closure criteria - also listed in Table 4 - it will be accepted that the mine has achieved the objective of economically viable and sustainable small stock agriculture.

Table 4 Objective evidence and closure criteria for economically viable and sustainable small stock agriculture

Closure objective	Document scope	Author	Success criteria (standard)
Viable stock production	Report on the monitoring results with regard to succession tempo of total cover in comparison with virgin vegetation adjacent to drill platforms	Independent EAP	Total cover and species composition is comparable to that of the adjacent virgin area
Sustainable production of grazing	Monitoring results of erosion on steep slopes (20% gradient) and disturbed areas	Independent EAP	At the time of closure, soil loss has stabilised over the whole previously disturbed area

5.3 Optimal post-mining social opportunities.

Activities and actions associated with achieving optimal post-mining social opportunities are discussed below. A number of risks could potentially realise for the socio-economic environment.

Demolition activities will result in dust and noise generation. Also, additional traffic will be generated as the mine is being demolished. To mitigate these risks, dust suppression measures will be continued and the planning of dust and noise generation activities will be communicated with nearby communities.

Minimal negative aesthetic impact will be achieved by the implementation of the tasks required to mitigate the risks associated with mine closure including the following:

- Wet access/haul roads to limit dust liberation by traffic and impose on-site speed restrictions.
- Involve all employees/contractors in the speed reduction campaign as road surface condition is more related to speed than to frequency of use
- Final maintenance of public and dual use roads to remain after closure.

Risks and risk levels associated with the objective of optimum post-mining social activities are listed in Table 5. At the time of final closure there will be no significant risks.

Table 5 Risks, risk levels and mitigating actions in terms of optimum post-mining social opportunities

Risk	Risk Rating	Mitigation Actions
Dust generation during demolition activities Noise generation during demolition activities Traffic during demolition activities	DC PM - N/A	Maintenance of the existing complaints register Communication of dust, noise and increased traffic related activities to the affected community and the expected durations of these activities Continuation of current dust suppression activities
Dust from farm roads and disturbed land	DC PM	Continuation of current dust suppression activities

The documentation which will be submitted as objective evidence and the closure criteria against which the contents of these documents will be measured are summarised in Table 6. Achieving these criteria will be evidence of achieving the objective of optimum post-mining social opportunities.

Table 6 Objective evidence and closure criteria for optimum post-mining social opportunities

Closure objective	Document scope	Author	Success criteria (standard)
Limited environmental impacts during demolition activities	Summary of all complaints received during demolition activities and follow up actions	Mine SHE Head, audited by independent EAP	Nuisance levels consistently on par with legislative standards after completion of demolition activities All incidents older than 90 days investigated and feedback given to complainant

6 ESTIMATED COST FOR REQUIREMENTS TO FULLY DECOMMISSION THE SITE

6.1 Assesment of financial provision

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).

6.2 Quantified Closure elements

The following risk based criteria and assumptions were used to calculate the final rehabilitation, decommissioning and closure cost:

- Access to the drill site will be via existing farm tracks. Equipment will be transported to site via the existing roads (including gravel and jeep track). No new roads will be required.
- If no tracks area available, ‘twee-spoor’ tracks will be made by driving the drilling rig (4 x 4) to such a site. This should be done under the supervision of the Environmental Officer
- Any new tracks created by driving the drill rig to the drill site will be rehabilitated by means of raking and/or scarifying trampled surfaces (tracks).
- The area of each drill pad which will be disturbed (total surface area) is approximately 160m² (Refer to Figure 1 for a layout of a typical drill site).
- Only where necessary will existing vegetation be removed. The topsoil will be kept aside for later rehabilitation around each drill pad to prevent contamination.
- Rehabilitation is carried out on a continuous basis as work progresses. It consists mostly of backfilling drill holes with the drill chips, removing of drill spoils from possible sumps, backfilling and profiling of sumps and ripping and cleaning up of drill pads and tracks used for drilling.
- Such rehabilitation is undertaken manually by raking over the disturbed site (scarifying) and placing topsoil over the raked area. This will be monitored continuously to ensure effective rehabilitation of disturbed areas. The rehabilitation work will be conducted in-house under the supervision of an Environmental Officer.
- Water required for drilling purposes (which may be required if drilling through soft clays are required) will be brought to site.
- The limited amount of water required for drilling purposes will be transported to site and stored in bowsers in the immediate area of prospecting.

- Vehicle routes between the water source and the prospecting drilling site will be along existing vehicle tracks and/or the limited 'twee-spoor' tracks that may be required to drive the drilling rig to the drill site.
- Should any clay horizons be intersected in the drilling of boreholes, it may be necessary to use water mixed with a drilling lubricant to assist with removing the clay and rock chips from the borehole. Such lubricant will also prevent the sides of the borehole collapsing.
- If such drilling is required, a drill sump will be excavated at each drill pad where clay is intersected and will be approximately 2.5m x 2.5m x 1.7m in extent and will be used to store and manage drilling fluid used during the drilling process (recycling of water).
- Each sump will be lined with a thick plastic liner to prevent seepage of the drilling water into the subsurface layers. The plastic liner will be reused at the other drill sites. The sumps will be demarcated with red and white tape or by other appropriate means. Each site will be rehabilitated directly after drilling.
- The drilling mud captured in the sumps will be dried and stored in leak proof receptacles and drill spoils will be removed from site and disposed of at a suitably licensed Municipal waste disposal facility.
- The drill sumps will be filled in with overburden, the top 150 mm being topsoil
- The general approach adopted for excavations is to reinstating the original profile of the landscape and ensuring the hydrological integrity of the area. Topography to follow the original landform shape.
- It is assumed that the post-mining sump stability will be addressed as part of the operation and necessary remedial actions implemented prior to closure
- In case of sudden un-planned closure there will always only be 2 drill platforms present on site one in the process of rehabilitation and one in the process of development.
- All compacted areas due to drilling platforms must be ripped to 300 mm
- All disturbed and exposed surfaces will be covered with at least 150 mm of topsoil and re-vegetation must be allowed to take place naturally
- A temporary equipment laydown / storage area will be located on an environmentally non-sensitive area (identified in consultation with the Environmental Officer and landowner), where the drill rig will be parked when not in use and will include an equipment/ materials laydown (storage) area and a chemical toilet.
- Diesel will be contained in a mobile bowser.
- Accommodation will be provided off-site in one of the nearby towns, and not at the drill site.
- All vehicles, plant and workshop equipment 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 (zero salvage assumed in cost estimation) and the remaining treated as waste and removed from site
- All services related to the operation, water supply lines and storage on site will have to be demolished; the closure cost is therefore included in this estimate.

6.2.1 Drill platforms

Area covered by 10 drill pad	1600m² (0.16Ha)
Overburden to be backfilled –	
excavation for drill sump if required 2.5m x 2.5m x 1.7m	10.625m³
Area covered by normal surface disturbance (levelling)	1600m² (0.16Ha)

6.2.2 Temporary laydown/storage area

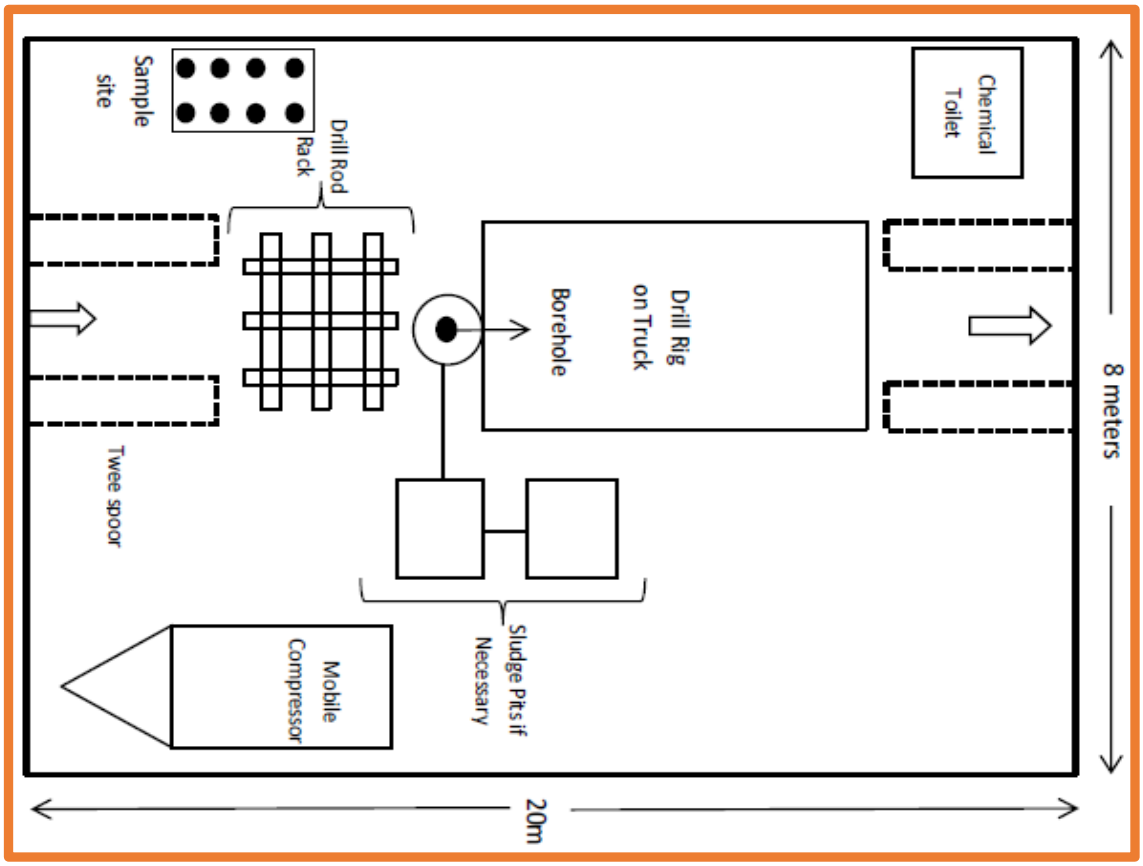
Area covered by normal surface disturbance	0.25Ha
Compacted area - parking and hauling area	0.25Ha

Remove waste from temporary storage and scrap from salvage yard	0.25Ha
Clean out Bunded Fuel Storage and Temporary Waste storage remove containers	0.25Ha
Final clean-up	1.0Ha

6.2.3 Final rehabilitation of drill traverses "tweespoor" tracks

Area covered by normal surface disturbance	5Km
Maintenance of dual-use road network	5Km

Figure 1 Typical layout of a drill platform



6.3 Calculation of Closure cost according to regulation 6 of NEMA Financial Regulations

For each closure element, various possible combinations of required rehabilitation work were identified and costs were calculated for each of these, based on quotations obtained from independent third party suppliers for earthmovmg equipment rental and various other consumables.

Equipment

Bulldozer Cat D9R	R1580.00/h
Excavator Cat 229	R 650.00/h
Grader Cat 140H	R 682.00/h
Loader Cat 928F	R 452.00/h
Tipper Truck 10m³	R 394.00/h
B25 dumper	R 450.00/h
Manual labour	R 48.68/h

- **Costs used for back filling by means of manual labour <20m³**

0.5 cub/hour for backfilling and profiling drill sumps @ R48.68/hour
Total Cost per m³ R97.36

- **Level and reinstate topography level disturbed areas**

Levelling and spreading topsoil drill pads 0.1Ha/h
Area covered 10h/Ha @ R48.68/hour
Cost/Ha R486.80
Manual raking and/or scarifying trampled surfaces drill pads 0.2Ha/h
Area covered 5h/Ha @ R48.68/hour
Cost/Ha R243.40
Total Cost per Ha R730.20

- **Demolish plant and subsurface structures**

10m³ Tipper Truck R394.00/h
Transport of rubble to dumpsite 1.0Hr/10m³
Transport cost per m³ R39.40
30 Ton Class Excavator Break concrete R651.50/h
Volume demolished and loaded 100 m³/h
Equipment Cost per m³ R 6.51
Cost per m³ R 45.91

- **Final rehabilitation of drill traverses "tweespoor" tracks**

Manual raking and/or scarifying trampled surfaces drill traverses 0.5Km/h
Area covered 2h/Km @ R48.68/hour
Cost/Km R97.36
Manual labour Erosion control
Area covered 1h/4Km @ R48.68/hour
Cost/Km R 24.34
Total Cost per Km R121.70

- **Final maintenance of duel use roads still required by landowner**

Catepillar 140 G R682.00/h
Grader Speed 8Km/h
Scraper width 3.5m
Graded area 4Km/h
Equipment Cost per Km R170.50
Manual labour Erosion control R24.34/h
Labour Cost per Km R 6.08
Total Cost per Km R176.58

- **Remove waste from temporary storage and scrap from salvage yard**

10m³ Tipper Truck R442.00/h
Transport of waste & scrap 3Hr
Equipment Cost R1326.00
Manual labour R24.34/h
Cleaning 8hrs
Labour Cost R 194.72
Total Cost R1520.70

- **Clean out Wash/Service Bay, Bunded Fuel Storage and Temporary Waste storage**

Manual labour R24.34/h
Cleaning 8hrs
Labour Cost R194.72
Treat petrochemicals in oil separator R2000.00
Total Cost R2194.72

- **Final clean-up**

10m³ Tipper Truck	R442.00/h	
Transport of waste & scrap	3Hr/20Ha	
Equipment Cost		R66.30/Ha
Manual labour	R24.34/h	
Final clean-up of mining related waste	8Hr/20Ha	
Labour Cost		R 9.73/Ha
Total Cost per Ha		R76.04

- **Aftercare and maintenance**

Manual labour	R24.34/h	
Annual clean-up of mining related waste	8Hr/20Ha	
Erosion control & invader plant clearing		16Hr/20Ha
Labour Cost		R29.20/Ha
Consumable cost		R 3.75/Ha
Years required		2
Total Cost per Ha over 2 years		R65.91

Total estimated cost for requirements to fully decommissioned the mining site at final closure

Drilling Platforms

Risk based criteria and assumptions with regard to drilling area

No back filling required by means of loading and hauling - distances >80m or by means of dozing - distances 20 - 80m
Backfilling of drill sumps will be done by hand
Level and reinstate topography level disturbed areas at drill pads will be done by hand
No plant or sub-structures will be present that requires decommissioning
Final rehabilitation of drill traverses "tweespoor" tracks will be done by hand
All disturbed and exposed surfaces will be covered with at least 150 mm of topsoil and re-vegetation must be allowed to take place naturally
It is assumed that the post-mining drill pad stability will be addressed as part of the operation and necessary remedial actions implemented prior to closure
Reinstating the original profile of the landscape and ensuring the hydrological integrity of the area.
Topography to follow the original landform shape.
The drill sumps will be filled in with overburden, the top 150 mm being topsoil

Closure Element Mitigating measures	Unit	No Units	Unit Cost	Cost per Element
Backfilling of drill sumps	m^3	20	R97.36	R1 947.20
Level and reinstate topography level disturbed areas	Ha	1	R730.20	R730.20
Final rehabilitation of drill traverses "tweespoor" tracks	Km	5	R121.70	R608.50
Final clean-up	Ha	5	R76.04	R380.20
Aftercare and Maintenance	Ha	3	R243.57	R730.71
Sub-Total				R4 396.81

Temporary laydown/storage area and infrastructure

Risk based criteria and assumptions with regard to rehabilitation of infrastructure

A temporary equipment laydown / storage area will be located on an environmentally non-sensitive area (identified in consultation with the landowner), where the drill rig will be parked when not in use and will include an equipment/ materials laydown (storage) area and a chemical toilet.
All vehicles, plant and workshop equipment will be removed for salvage or resale
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 operation, water supply lines and storage on site will have to be demolished; the closure cost is therefore included in this estimate
All compacted areas due to hauling and salvage must be ripped to 300 mm
Existing tracks will be used and new tracks must be restricted to the absolute minimum.
All fences and access roads must be handed back to the landowner in a good state of repair

Closure Element Mitigating measures	Unit	No Units	Unit Cost	Cost per Element
Level and reinstate topography level disturbed areas	Ha	2	R730.20	R1 460.40
Final maintenance of access roads	Km	5	R176.58	R882.90
Remove waste from temporary storage and scrap from salvage yard	*	1	R1 520.70	R1 520.70
Cleanout Wash/Service Bay	*	1	R2 194.72	R2 194.72
Final clean-up	Ha	5	R76.04	R380.20
Aftercare and Maintenance	Ha	3	R65.91	R197.73
Sub-Total				**R6 636.65**
Total financial provision required to fully decommission and rehabilitate the prospecting operation				**R11 033.46**

7 THE PUBLIC PARTICIPATION PROCESS

7.1 Principles and Objectives

The Public Participation Process (PPP) was designed to fulfil the requirements of several pieces 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 prospecting 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,
- 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 (DWAS, DMR), Provincial and Local Government (Local and District Municipalities)
- Industry (commercial farmers)
- Corporations and businesses (service providers to operation)
- Operations staff

The operation set up a database of I&APs using existing project databases as a starting point. Names of persons and organisations will be added to or deleted from the database where appropriate.

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.