MINE CLOSURE PLAN

REMAINDER SANDVLEI NO 1020, DIVISION MALMESBURY

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1. INTRODUCTION

There is growing demand throughout the world to confront the issue of mine closure and to create successful mine closure systems as already, according to IIED (2002), the *pollution legacy* makes the sustainability of mining activities difficult to achieve. Ideally, appropriate planning for closure of mining operations should be performed during the feasibility, design and permitting phases of a mine, and be improved during the operational life of the mine (Mudder & Harvey, 1999). This approach has become the standard and is a required practice today. According to Robertson & Shaw (2005), there has been a global trend since the 80's towards '*Designing for Closure*', with environmental protection and closure measures being designed into existing mine operations and being mandatory for opening new mines.

The lack of a complete or revised mine closure plan can result in severe environmental and economic consequences. Inadequate closure activities, water management, and waste rock disposal plans have prompted unexpected and, in some instances, unwarranted secondary Environmental Impact Assessments (EIAs) (Mudder & Harvey, 1999). Therefore through prior and progressive planning and implementation of measures, the costs and impacts on the environment can be minimized.

Legislation governing mining within South Africa has been in existence for many years and periodically undergoes review and amendment. The last major change was the enactment of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) ("MPRDA"). This law has national scope for the operation, prospecting and the governance of all minerals rights and has furthermore set the requirement of a closure plan to form part of a mine's EMPR (Section 43 (3)(d)).

The MPRDA, Mineral and Petroleum Resources Development Regulations 56 to 62, outline the entire process of this mine permit closure. The mine permit holder has complied with all of these requirements and prepared:

- A closure plan (Regulation 62) (this plan);
- An environmental risk report (Regulation 60); and

Annual performance reports as well as a final performance assessment report (Regulation 55(9) will be submitted to DMR on completion of the mine operation and all the permit requirements.

2. A DESCRIPTION OF THE CLOSURE OBJECTIVES AND HOW THESE RELATE TO THE MINE OPERATION AND ITS ENVIRONMENTAL AND SOCIAL SETTING

Once the mining resources have been exhausted, excavation pits to be backfilled with unused excavated material. The mining process will reduce the depth of the sand but, following the recommended rehabilitation measures, will leave a minimum of 500 mm of sand above the clay

layer after rehabilitation. This reduced depth will have little effect on the agricultural potential because there is sufficient drainage and soil depth in the proposed mining area.

During mining, the outflow of run-off water from the mining excavation must be controlled to prevent any down-slope erosion. This must be done by way of the construction of temporary banks and ditches that will direct run-off water. These should be in place above the mining area, to minimise run-off into the excavation and at any points where overflow out of the excavation might occur. The upper 30 cm of the soil must be stripped and stockpiled before mining. Mining can then be done down to the 20cm above the clay layer (or other depth limiting layer). Topsoil is a valuable and essential resource for rehabilitation and it should therefore be managed carefully to conserve and maintain it throughout the stockpiling and rehabilitation processes. Topsoil stripping, stockpiling and re-spreading must be done in a systematic way. The mining should be such that topsoil is stockpiled for the minimum possible time by rehabilitating different mining blocks progressively as the mining process continues. Topsoil stockpiles should be protected against losses by water and wind erosion. Stockpiles should be positioned so as not to be vulnerable to erosion. Stockpiles should be no more than 2 metres high.

To ensure minimum impact on drainage, it is important that no depressions are left in the mining floor. A surface slope (even if minimal) must be maintained across the mining floor in the drainage direction, so that all excavations are free draining. After mining, any steep slopes at the edges of excavations must be reduced to a minimum and profiled to blend with the surrounding topography. The stockpiled topsoil must then be evenly spread over the entire mining area, so that there is a depth of at least 50cm of sandy topsoil above the underlying clay. The depth should be monitored during spreading to ensure that coverage is adequate and even. It is important that rehabilitation is taken up to the point of regrowth of seeds and removal of *Acacia saligna* and site stabilisation. Rehabilitation cannot be considered to be complete until the first plant growth is well established. The rehabilitated area must be monitored for erosion, and appropriately stabilised if any erosion occurs. On-going alien vegetation control must keep the area free of alien vegetation after mining.

The possible risk factors that could be considered in the risk report are the rehabilitation of the mining area and impacts to agricultural land. Therefore close attention will be paid to these factors during the operational life of the project. The Company is aware that the holder of the mining permit is liable for any and all environmental damage or degradation emanating from the mining operation until a closure certificate is issued in terms of Section 43 of the MPRDA.

3. A PLAN CONTEMPLATED SHOWING THE LAND OR AREA UNDER CLOSURE

Please refer to Mine Area Plan in application

4. A SUMMARY OF THE REGULATORY REQUIREMENTS AND CONDITIONS FOR CLOSURE NEGOTIATED AND DOCUMENTED IN THE ENVIRONMENTAL MANAGEMENT PROGRAMME OR ENVIRONMENTAL MANAGEMENT PLAN

It is important to note that regulatory criteria are likely to change over time, and criteria selected for the purposes of closure planning during early operations, may not be applicable at the time of closure.

The following legislation and policies are applicable to mining operations and final closure procedures:

- **Constitution of the Republic of South Africa (Act No.108 of 1996, Section 24)**

'The environment must be protected for present and future generations through reasonable legislation and other measures that will prevent pollution and environmental degradation, promote conservation and will ensure ecologically sustainable development and sustainable use of natural resources while striving for justifiable economic and social development.'

- **National Water Act, 1998 (Act No. 36 of 1998): Section 19**

Section 9 of the Regulations on use of water for mining activities focuses on the temporary or permanent closure of mines or related activities. Section 9 (1) states *'any person in control of a mine or activity must at either temporary or permanent cessation of operations ensure that all pollution control measures have been designed, modified, constructed and maintained so as to comply with these regulations'* and Section 9(2) states that the same mine *'….must ensure that the instream and riparian habitat of any water resource, which may have been affected or altered by a mine or activity, is remedied so as to comply with these regulations*'.

- **National Environmental Management Act, 1998 (Act No. 107 of 1998)**

Outlines the duty of care to prevent pollution. The polluter is liable for any rehabilitation costs and any damages caused by pollution as stated within the National Water Act, 1998.

- **Mine Health and Safety Act, 1996 (Act No. 29 of 1996)**

Section 2 (2) states that '*the owner of a mine that is not being worked, but in respect of which a closure certificate in terms of the MPRDA has not been issued, must take reasonable steps to continuously prevent injuries, ill-health, loss of life or damage of any kind from occurring at or because of the mine'.* Section 9 stipulates that a Code of Practice (CoP) is required for MRD. Provisions for rehabilitation and closure are made within these CoPs.

- **Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)**

Section 43 places an obligation on the holder of mining related rights to apply to DME for a closure certificate within 180 days of a prescribed event. The application must contain a risk assessment. Section 44 states that when a prospecting right, mining right, retention permit or mining permit lapses, is cancelled or is abandoned or when any prospecting or mining operation comes to an end, no buildings, structures and other objects are to be demolished or

removed in terms of any other law (e.g. National Heritage Resource Act, 1999 (Act No. 25 of 1999)) or which have been identified in writing by the Minister.

- **National Environmental Management Air Quality Act, 2004 (Act 39 of 2004)**

Section 33 states that if mining operations are likely to cease within a period of five years, the owner of that mine must promptly notify the Minister in writing-
(a) of the likely cessation of those mining operations; and
(b) of any plans that are in place or in contemplation for-
(i) the rehabilitation of the area where the mining operations were
(ii) the prevention of pollution of the atmosphere by dust after those conducted after mining operations have stopped; and operations have stopped.

- **Conservation of Agriculture Resources Act, 1983 (Act No. 43 of 1983)**

In terms of the amendments to the regulations under this Act, landowners are legally responsible for the control of alien species and to handle storm water to prevent erosion on their properties and to protect agricultural resources.

- **Broad-Based Socio-Economic Empowerment Charter for The South African Mining Industry**

Section 4.1. Through the Mines Qualifications Authority (MQA), shall undertake to provide skills training opportunities to miners during their employment in order to improve their income earning capacity after mine closure.

The possible risk factors that could be considered in the risk report are the rehabilitation of the mining area and impacts on agricultural land. Therefore close attention will be paid to these factors during the operational life of the project. The Company is aware that the holder of the mining permit is liable for any and all environmental damage or degradation emanating from the mining operation until a closure certificate is issued in terms of Section 43 of the MPRDA.

The principles for mine closure in accordance with the applicable legislative requirements for mine closure, the holder of a mine permit must ensure that:

- the closure of a mining operation incorporates a process which must start at the commencement of the operation and continue throughout the life of the operation
- risks pertaining to environmental impacts must be quantified and managed pro-actively, which includes the gathering of relevant information throughout the life of a mining operation
- the safety and health requirements in terms of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) are complied with
- residual and possible latent environmental impacts are identified and quantified
- the land is rehabilitated, as far as is practicable, to its natural state (ploughed land planted with pastures and used for grazing) which conforms with the concept of sustainable development; and
- mining operations are closed efficiently and cost effectively.

5. A SUMMARY OF THE RESULTS OF THE ENVIRONMENTAL RISK REPORT AND DETAILS OF IDENTIFIED RESIDUAL AND LATENT IMPACTS

The risk assessment tool is founded upon a risk register, comprised of 26 potential risks, covering the full range of activities associated with the identification, planning operation and closure of sand material sources. These risks are divided into the following logical structure of risk categories:

- Health and safety risks (5);
- Technical risks (1);
- Natural environment risks (7);
- Built environment risks (5);
- Economic risks (1); and
- Legal and authorisation risks (7).

Refer to the BAR and EMPr for more detail.

The potential impacts of decommissioning the mine include soil erosion, alien species spreading and a loss of employment. The site will be rehabilitated after mine closure and this is detailed in the EMP.

All impacts and aspects have been identified and assessed by both EAP and the public through EAP and specialist assessment and the public participation process. The following summarises the impacts thereof:

- The proposed development is surrounded by agricultural land and as such will not disturb any local residence in terms of visual, noise or dust aspects.
- The proposed development will provide employment for local residents.
- The proposed development is on a previously degraded site, while all costs associated with the rehabilitation are for the applicant's account.
- The proposed development gives attention to sensitive, vulnerable, highly dynamic or stressed ecosystems, such as the natural veld, fresh water aquatic systems and archaeological sites.

6. A SUMMARY OF THE RESULTS OF PROGRESSIVE REHABILITATION UNDERTAKEN

There are three main categories of rehabilitation for the *after-use* of land that will be sustainable in the long term (Robinson & Shaw, 2005):

Walk-away status: there are no remaining residual constraints on the future land use after rehabilitation has been performed and no additional monitoring or maintenance requirements.
Passive care: there is minimal need for monitoring and infrequent maintenance of noncritical structures.
Active care: requires regular operations, monitoring and maintenance of the site that is not typical of normal land management practices. There may be permanent constraints on the

beneficial use of the land, such as high metal concentrations.

Rehabilitation will occur in the walk-away and passive care phases. However the ultimate objective would be to reach *walk-away status* after a closure certificate has been issued.

The rehabilitation entails the removal of all manmade structures and equipment, with the entire area then to be rehabilitated to its original state which is ploughed cultivated lands. Reserved rehabilitation funds are to be placed into a separate account from the start, monthly in arrears, to cover the cost of such rehabilitation. This will be done in phases as per the plan and map submitted as part of the mine operation procedures.

7. A DESCRIPTION OF THE METHODS TO DECOMMISSION EACH MINING COMPONENT AND THE MITIGATION OR MANAGEMENT STRATEGY PROPOSED TO AVOID, MINIMIZE AND MANAGE RESIDUAL OR LATENT IMPACTS

During the decommissioning and closure phases consideration of the following is essential (Robertson & Shaw, 2005):

- Physical stability – mine area and access road must be stable so as to eliminate any hazard to the public health and safety or material erosion to the terrestrial or aquatic receiving environment at concentrations that are harmful. Engineered structures must not deteriorate and fail.
- Surface waters and groundwater must be protected against adverse environmental impacts resulting from mining and processing activities.
- Land use - the closed mine site should be rehabilitated to pre-mining conditions or conditions that are compatible with the surrounding lands.

The mining process will reduce the depth of the sand but, following the recommended rehabilitation measures, will leave a minimum of 500 mm of sand above the clay layer after rehabilitation.

The topsoil is stockpiled for the minimum possible time by rehabilitating different mining blocks progressively as the mining process continues. During rehabilitation, the stockpiled topsoil must be evenly spread over the mining surface. Topsoil spreading should be done continuously. There is sufficient slope and elevation in the proposed mining area to avoid the creation of depressions, provided that mining depths are controlled to ensure the maintenance of a slope. No compaction in the soil should remain after rehabilitation. Compaction will impede water movement through the soil profile.

8. DETAILS OF ANY LONG-TERM MANAGEMENT AND MAINTENANCE EXPECTED

Ideally, a properly designed and executed rehabilitation plan will leave the mine in a condition requiring no continuing, long-term maintenance to achieve an enduring, high quality environment. The mine permit holder commits to post-closure maintenance during

rehabilitation of the site and until the time of receipt of a closure certificate for all or parts of the mining area. Long-term care will include maintenance of all storm water infrastructures. Thereafter, the responsibility for the ongoing maintenance and monitoring of the site will rest with the future landowners.

Management and maintenance is expected to continue until after the first winter rain season after the closure certificate is issued. Maintenance will be focused on erosion and crop cover on the mine area.

9. DETAILS OF A PROPOSED CLOSURE COST AND FINANCIAL PROVISION FOR MONITORING, MAINTENANCE AND POST CLOSURE MANAGEMENT

A total of R 80 000 will be provided. The calculation was determined using and compiling the financial and technical competence report that will be submitted with the mine permit application.

10. A SKETCH PLAN DRAWN ON AN APPROPRIATE SCALE DESCRIBING THE FINAL AND FUTURE LAND USE PROPOSAL AND ARRANGEMENTS FOR THE SITE

Please refer to the Mine Area Plan in the BAR and EMP for a detailed sketch plan.

11. A RECORD OF INTERESTED AND AFFECTED PERSONS CONSULTED

Registered Interested and Affected Parties and key departments were afforded a 30 day comment period on the consultative BAR, application, closure plan and EMP. The comments are recorded and the EAP (specialists) respond to the comments and compile the comments and response report where after it is submitted to DMR for a decision.

12. REFERENCES

IIED (2002). *Research on Mine Closure Policy*. Mining, Minerals and Sustainable Development Project. Report Number 44. International Institute for Environment and Development (IIED).

Mudder, T & Harvey, K (1999). *Closure Concepts.* Mineral Resources forum. UNEP, 1999.

Robertson & Shaw (2005). *Mine Closure.* Robertson GeoConsultants Inc. www.infomine.com. Date Accessed 2005.