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**CLOSURE PLAN**

**FOR**

**ESTABLISHMENT OF A SUPER FINES  
STORAGE FACILITY AT GLORIA MINE**

**Department of Mineral Resources:  
(NC)30/5/1/2/2/203 MRC**

**05 May 2020**

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## **CLOSURE PLAN:**

# **SUPER FINES STORAGE FACILITY AT GLORIA MINE**

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# TABLE OF CONTENTS

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1	Closure and Rehabilitation PHASE.....	3
1.1	Principles of rehabilitation .....	3
1.2	Rehabilitation objectives.....	3
1.2.1	re-vegetation .....	4
1.2.2	Maintenance.....	4
1.3	Establishment of natural Kathu Bushveld and Gordonia Duneveld on the rehabilitated areas ..	5
1.4	Maintenance of rehabilitated areas.....	5
1.5	Areas and activities to be rehabilitated .....	6
1.5.1	Mine residue deposits .....	6
1.6	General Surface REhabilitation.....	6
1.6.1	Buildings and Infrastructure .....	14
1.7	Conclusions and summary of rehabilitation plan.....	14

# 1 CLOSURE AND REHABILITATION PHASE

This closure and rehabilitation plan is in alignment with the broader BRMO rehabilitation plan and provides details as to how site rehabilitation (whether this is concurrent with on-going operations, or at closure) should be undertaken, with step by step break-down of disturbed areas to be rehabilitated, when those areas should be rehabilitated, as well as a description of the actual rehabilitation measures to be implemented.

It must be noted that the nature of the proposed activities is such that there will not be any annual of on-going rehabilitation once the construction phase has been completed. Thus the focus is on the closure phase.

## 1.1 PRINCIPLES OF REHABILITATION

The following principles should be followed during the planning, implementation and post-implementation phases of the rehabilitation process:

- Define and agree upon end-goals for the rehabilitation process, such as land-use, rehabilitation objectives, areas to be rehabilitated, etc.;
- Prevent and continually manage the propagation and establishment of alien and invasive species;
- As far as is practical, implement concurrent rehabilitation in order to limit degradation of soil biota;
- Limit the footprint area of the disturbing activity in order to minimise environmental damage;
- Rehabilitation earthworks should aim to reshape the disturbed areas to represent the area prior to disturbance (with the exception of the two opencast voids) and to present a safe, functional and sustainable environment;
- Visual impacts of rehabilitated areas must be minimised by recreating natural landforms and ensuring that reshaped areas are visually suited to surrounding landscapes;
- Natural landforms such as drainage lines, undulating areas and ridges, which have been damaged during activities, must be restored;
- Implement erosion control measures to prevent the loss of topsoil;
- Rip and aerate all compacted soils in order to facilitate plant establishment and growth;
- Re-vegetate all disturbed areas with suitable vegetation cover and methods;
- After completion of activities ensure that the site is safe for use by the intended land users and remove all activity equipment; and
- Implement a monitoring plan to determine the efficacy of the rehabilitation exercise (this should be a long-term monitoring program).

## 1.2 REHABILITATION OBJECTIVES

The rural/agricultural nature of the mine, and the aridity of the area, limits the range of potentially feasible end land-use alternatives available to BRMO at the end of life of the mine.

The overall environmental objectives of mine closure are as follows:

- To rehabilitate the disturbed areas to arable grazing land capable of at least supporting an extensive livestock production system;

- To restore the pre-development topography to the greatest extent that is practical and feasible at closure;
- To restore the site biodiversity and ecological system functioning to as close as practically possible to pre-development conditions;
- To ensure that the site is made safe;
- To ensure that final site shaping allows for free drainage of rainwater and the prevention of erosion;

To ensure that the pollution generating potential of residue deposits and residue stockpiles is addressed through appropriate capping and closure thereof, where applicable; and

To ensure that potential residual impacts on the underlying aquifers are managed.

To ensure that significant entrainment of particulate matter is prevented through adequate land cover and shaping where necessary.

The area affected by BRMO's operations should not pose any significant direct, indirect or residual risks to either human health and livelihoods, or environmental quality, over the short-, medium- or long-term post closure and rehabilitation thereof.

### 1.2.1 RE-VEGETATION

- A grass mixture of species endemic (particularly important to ensure that grasses are non-invasive) within the area, such as *Aristida meridionalis*, *Centropodia glauca*, *Stipagrostis ciliata*, *Eragrostis lehmanniana* and *Schmidtia pappophoroides*, should be utilised in the seeding process;
- The seed mixture should be incorporated into a mulch which includes fertiliser and germination acceleration agents;
- The seed mulch should then be along with suitable means for maintain stability;
- The seeded areas should then be irrigated; and
- Weekly monitoring should take place in order to ascertain the efficacy of the seeding and to repair any areas where gullies or rills are forming.

### 1.2.2 MAINTENANCE

- Along the crest of steep gradients a 1 m high Hessian screen should be placed around the facility to assist with the trapping of seeds and to protect the crest from wind erosion;
- Application of fertiliser should take place in order to ensure efficient establishment of vegetation cover until such time as sufficient organic matter is being produced by the established grasses to allow for self-sustaining growth;
- The process of 'Unification' can be utilised to ensure a constant supply of organic compost (fertiliser). This entails the establishment of a compost heap, where cleared indigenous organic matter is stored and allowed to break down naturally to the point of resembling garden compost; and
- Care must be taken to ensure that only indigenous plant matter is utilised for this process, as the presence of alien invaders may cause the establishment of invader plant communities in the rehabilitated areas.

### **1.3 ESTABLISHMENT OF NATURAL KATHU BUSHVELD AND GORDONIA DUNEVELD ON THE REHABILITATED AREAS**

- Once sufficient basal cover has been established, the introduction of species representative of the applicable vegetation types must commence;
- Introduction of these species should commence through the stages of natural floral succession [i.e. Pioneer species (grasses, herbaceous species), Secondary species (grasses, small shrubs, and small trees) and Climax state (larger shrubs, large trees)];
- This process will also occur naturally as seeds from the neighbouring areas are introduced and germinate;
- Certain tree species with special mention of *Acacia erioloba*, *Acacia haematoxylon* and *Boscia albitrunca* can be selectively introduced, however consideration will need to be given to rooting depths and soil stability as well as the ability of the trees to establish on the subject area;
- A test area should be designated to test possible tree species to be introduced for their ability to grow in different substrates. This should commence immediately in order to allow informed decision making once rehabilitation commences; and
- The primary goal is to achieve a stable, climax state, representative of the vegetation types where the ecological function of the plant community is tolerant of most environmental conditions it encounters.

### **1.4 MAINTENANCE OF REHABILITATED AREAS**

All areas must be maintained for a period of 5 years after formal rehabilitation ceases. During maintenance, the following should be done:

- Clearing of alien and invasive plants to allow native and indigenous plants to out-compete invasives and take a strong hold in the area;
- Watering of larger trees that were planted during rehabilitation to allow for these trees to establish adequately;
- Patching/fixing (if necessary) of any areas that have eroded since rehabilitation;
- If hydro-seeding was not effective during 1<sup>st</sup> application, a second application of hydro-seed mixture may have to be applied in certain areas. The application of hydro-seed should be at the discretion of the hydro-seeding specialist;
- Maintain water run-off areas so as to not increase chances of further potential erosion;
- Encourage growth of plants and grasses by cordoning off, fertilising and watering areas that have struggled to take root or re-vegetate; and
- Areas of high importance (i.e. slopes and riparian areas) should be more vigorously maintained, fertilized and watered during maintenance.

## 1.5 AREAS AND ACTIVITIES TO BE REHABILITATED

In general terms, the rehabilitation requirements for various areas of disturbance at the mine will be relatively homogenous, with the exception of distinct features such as the SFSF.

Distinction has been made between areas that require general surface rehabilitation alone (i.e. following the removal of surface structures and infrastructure, as well as site preparation for rehabilitation), and those activities that warrant unique management and rehabilitation provisions at closure (Table 1-2); where, *inter alia*, the following circumstances warrant such interventions:

- The activity/area presents a potential, residual, point source of groundwater- or soil pollution; or
- The activity/area presents a potential, direct, risk to human health or well-being.

### 1.5.1 MINE RESIDUE DEPOSITS

Mine residue deposits i.e. tailings dams, present potential point sources of groundwater pollution and continued visual intrusion following closure of the mines. These facilities will, unless otherwise recovered, remain on the surface at mine closure and require specific actions at closure, or concurrent to operation, to mitigate the potential long-term impacts thereof on groundwater quality and the visual and aesthetic character of the landscape.

The required mitigation at closure will differ from the greater closure and rehabilitation provisions for 'general surface rehabilitation'. These facilities will also need to be effectively fenced-off from the remainder of the site in order to prevent any potential injury, or loss of life, that could result through indiscriminate access thereto until final closure status is achieved. The unique closure and rehabilitation of such facilities is discussed in Table 1-2.

## 1.6 GENERAL SURFACE REHABILITATION

The 'general surface rehabilitation' of degraded/disturbed mine areas to meet the stated end land-use objectives, must comply with the following broad sequentially implemented phases of rehabilitation:

- Phase 1: Removal of all surface structures and infrastructure, as well as buried service infrastructure that may act to impede subsequent phases of rehabilitation;
- Phase 2: Preparation and amelioration of structural and infrastructural development footprints for further rehabilitation;
- Phase 3: Sequential replacement of stockpiled top- and treatment of sub-soil where topsoil is lacking, to mimic pre-mining soil profiles;
- Phase 4: Initial hydro-seeding of prepared areas to establish basal cover for subsequent rehabilitation;
- Phase 5: Initial maintenance and monitoring of basal cover;
- Phase 6: Establishment of Central Sandy Bushveld tree species once sufficient basal cover is achieved; and
- Phase 7: On-going monitoring and maintenance.

Table 1-1 and Table 1-2 that follow provide further detail as to the actions that need to be taken by BRMO for each of the respective phases of surface rehabilitation. Note that requirements specific to the SFSF are in Table 1-2.

Table 1-1: Requirements for General Surface Rehabilitation				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	* Time-frames/ Frequency
Preparation and Initiation				
A1	Notify the Minister of Environmental Affairs of intended cessation of mining activities and rehabilitation in accordance with S33 of NEM:AQA.	Minister notified	Environmental Officer	5 years prior to cessation.
A2	Appoint a project manager to oversee the process	Project manager appointed	Mine manager	Once-off prior to commencement of closure
A3	Appoint specialists as required for the rehabilitation process	Environmental specialists appointed	Environmental Officer (with support of project manager)	Once-off
A4	Identify any protected species that may require permitting prior to disturbing.	Required biodiversity permits in place.	Environmental Specialist	Prior to commencement.
A5	If any archaeological artefacts of potential significance are identified at any stage, work must cease and SAHRA must be notified for instruction on how to proceed.	No destruction or disturbance of potentially significant artefacts	Environmental Specialist	On going
PHASE 1: Removal of Surface Structures and Infrastructure				
1.1	All surface structures, infrastructure and 'hard surfaces' ( <i>inter alia</i> , redundant surfaced roads, parking and paved areas) are to be demolished and removed from the disturbed footprint; unless an alternative/continued use for any such items is agreed upon, in writing, with the Department of Mineral Resources (DMR).	Area cleared of all mining related structures and infrastructure.	Project Manager	Once-off
1.2	The foundations of removed structures and infrastructure are to be removed to a depth of at least 0.5m below ground level.	No remaining sub-surface structures that may impede further phases of rehabilitation, or the ultimate root penetration of re-introduced plant and tree species.	Project Manager	Once-off



Table 1-1: Requirements for General Surface Rehabilitation				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	* Time-frames/ Frequency
1.3	On-going alien and invasive floral species control is required through all phases of rehabilitation.  Edge effects of decommissioning and closure activities, such as erosion and alien plant species proliferation, which may affect adjacent sensitive habitat, need to be strictly managed adjacent to the footprint;	No establishment and propagation of 'undesirable' plant species over rehabilitation sites.	Environmental Officer	On-going. Monthly inspections; unless otherwise expressly stated for subsequent phases of rehabilitation
PHASE 2: Preparation of underlying soils for further phases of rehabilitation				
2.1	Exposed, compacted, soil surfaces must be ripped to a depth of at least 0.5 m to allow for adequate aeration and plant root penetration.	No topsoil replacement on compacted underlying soil horizons.	Project Manager	Once-off
2.2	Pre-mining topography should be reasonably restored through shaping, such that the topography of rehabilitated areas will ultimately be commensurate with that of adjacent, non-disturbed areas, with the exception of tailings facilities if they are to remain. Consultation with a hydrologist may be required to eliminate potential for prevent erosion.	No evidence of significant alteration to 'natural', pre-mining, surface drainage and topographical regime.	Project Manager	On-going
2.4	Care should be taken in choosing a method/machinery to implement 2.2 above, such that ripped soils are not re-compacted through efforts to appropriately shape the disturbed sites.	No topsoil replacement to compacted underlying soil horizons.	Project Manager	Once-off
2.5	Vehicular access to rehabilitation sites from this phase of rehabilitation onward should be limited to vehicles/machinery expressly required for the sound implementation of this plan.	No <i>ad hoc</i> , unauthorised, vehicular movements over rehabilitation sites.	Project Manager	On-going
PHASE 3: Topsoil/growth substrate replacement/preparation				
3.1	As far as available stockpile volumes allow, topsoil should be replaced in the appropriate order to a consistent depth of at least 20cm across areas prepared in terms of phase 2. Where topsoil is insufficient, subsoil must be treated in accordance with the specification of the soil specialist to meet rehabilitation objectives.	Topsoil replacement implemented prior to further efforts to re-introduce basal cover. Even surface, free from surface ponding of water.	Environmental Officer	Once-off

Table 1-1: Requirements for General Surface Rehabilitation				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	* Time-frames/ Frequency
3.2	Topsoil should be screened, as necessary, to remove any foreign objects, rocks, etc., prior to the replacement thereof.	Replacement of topsoil that is fit for purpose, and which does not impede BRMO from achieving the stated end-use objectives for the site.	Project Manager	On-going
3.3	Topsoil, and modified subsoil should at least meet the following physical and chemical profile required for successful rehabilitation:	Replacement of topsoil that is fit for purpose, and which does not impede BRMO from achieving the stated end-use objectives for the site.	Project Manager, soil scientist	Once-off
3.4	Any areas with slope $\geq 3^\circ$ should be inspected weekly for signs of topsoil erosion following the replacement thereof, and appropriate action taken to curb any problematic areas.	Records of weekly 'erosion inspections'. No topsoil erosion following replacement.	Environmental Officer	Monitor weekly, address erosion within 48 hours
3.5	Care should be taken during topsoil replacement to minimise the extent to which vehicle movement over replaced topsoil may act to compact these surfaces.	No significant compaction of soil surfaces prior to commencement of re-seeding (phase 4)	Project Manager	On-going
<b>PHASE 4: Re-seeding for basal cover establishment</b>				
4.1	A mixture of endemic vegetation known to be non-invasive within the area, should be utilised in the re-seeding process for the re-introduction of basal cover over rehabilitation sites.	Establishment of basal cover commensurate with the indigenous floral communities of the pre-mining site, such that would also allow BRMO to meet the stated land-use objectives for the site.	Project Manager	Once-off
4.2	BRMO should investigate the commercial availability of seed stocks of the aforementioned grass species; and if not commercially available, BRMO must implement a seed harvesting programme from undisturbed areas of the surface rights area (in conjunction with a competent specialist).	Sufficient available seed stock on hand to effect rehabilitation that meets the stated land-use objective for the site.	Proponent, specialist	Proof of commercial availability within 3 months of the EMP approval, or seed harvesting programme commencement within 12 months.

Table 1-1: Requirements for General Surface Rehabilitation				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	* Time-frames/ Frequency
4.3	Seeding, or any other suitable means of re-introducing basal cover, should be planned and implemented in conjunction with the professional inputs and services of a competent contractor, with experience in such undertakings.	Optimal establishment of basal cover that will ensure that BRMO achieves the stated end-use objectives for the site.	Environmental Officer	Once-off appointment with on-going management thereafter
4.4	Re-seeding should commence within 14 days of topsoil replacement, and areas should be free of alien and invasive plants.	Records kept of topsoil replacement and re-seeding dates for all rehabilitation sites.	Environmental Officer	Within 30 days of topsoil replacement
4.5	The potential requirements for the irrigation and fertilisation of seeded areas, is to be done according to the recommendations and specifications of the specialist contractor appointed for this work.	Optimised efficacy of efforts to establish appropriate basal cover over rehabilitated areas.	Environmental Officer	Once-off
4.6	No grazing on rehabilitated areas is to occur within three years of phase 4 completion.	<ul style="list-style-type: none"> <li>• Documented records of dates upon which re-seeding was effected;</li> <li>• Establishment of robust basal cover prior to introducing grazing herbivores; and</li> <li>• BRMO to meet stated end land-use objectives for the site</li> </ul>	Project Manager	3 years from re-seeding
<b>PHASE 5: Intermediary monitoring and maintenance of basal cover</b>				
5.1	Weekly monitoring should take place in order to ascertain the efficacy of the seeding, and to repair any areas where gullies or rills are forming. Appropriate interventions to be adopted where basal cover establishment fails.	Documented records of weekly inspections. Basal cover establishment commensurate with adjacent undisturbed areas over the mine surface rights areas (i.e. % cover relative to exposed soil surfaces).	Environmental Officer, ecologist	Weekly monitoring until adequate basal cover establishment has been confirmed by an ecological specialist
5.2	Regular application of fertiliser, under the guidance of a suitably qualified soil scientist, should take place in order to ensure efficient establishment of vegetation cover until such time as sufficient organic matter is being produced by the established grasses to allow for self-sustaining growth.	Basal cover establishment commensurate with adjacent undisturbed areas over the mine surface rights areas (i.e. % cover relative to exposed soil surfaces).	Environmental Officer, soil scientist	On-going, as per specialist recommendations

Table 1-1: Requirements for General Surface Rehabilitation				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	* Time-frames/ Frequency
5.3	If re-seeding for basal cover establishment was not effective during 1st application, a second application of hydro-seed mixture may have to be applied in certain areas. The application of hydro-seed should be at the discretion of the specialist contractor.	Basal cover establishment commensurate with adjacent undisturbed areas over the surface rights areas (i.e. % cover relative to exposed soil surfaces).	Environmental Officer, rehabilitation contractor	As necessary, per specialist recommendations
<b>PHASE 6: Establishment of Central Sandy Bushveld</b>				
6.1	Once sufficient basal cover has been established, the introduction of species representative of the applicable vegetation types over the site may commence.	Establishment of stable, climax state, plant communities on rehabilitated areas.	Environmental Officer	On-going
6.2	Introduction of these species should commence through the stages of natural succession (i.e. Pioneer species (grasses, herbaceous species), Secondary species (grasses, small shrubs, and small trees) and Climax state (larger shrubs, large trees).	Establishment of stable, climax-state, plant communities on rehabilitated areas.	Environmental Officer	On-going
6.3	The potential requirements for the irrigation and fertilisation of re-introduced floral species, is to be done according to the recommendations and specifications of the specialist contractor appointed for this work.	Effective establishment and growth of introduced floral species.	Environmental Officer and Project Manager	On-going.
<b>PHASE 7: On-going monitoring, maintenance and aftercare</b>				
7.1	Monitoring and maintenance (as necessary) of phase 6 implementation is to be effected for at least five years following the completion of active species re-introduction to the site.	<ul style="list-style-type: none"> <li>At least 90%, sustainable, establishment of re-introduced plants/trees; and</li> <li>'Ecological' objectives for site closure met.</li> </ul>	Environmental Officer	On-going, Monthly inspections for at least two years; every 6 months thereafter if efforts to rehabilitate are proving effective.
<b>GENERAL PROVISIONS</b>				
8.1	External, independent, 'Mine Rehabilitation' compliance audits must be undertaken by a competent auditor for all areas where rehabilitation is being implemented at the mine.  Audit to at least document compliance with this plan, as well as any other relevant provisions of the EMP revision approval by the DMR.	Full compliance with the provisions for mine site rehabilitation.	Environmental Officer	Every 6 months for as long as any rehabilitation (concurrent and/or closure) is being undertaken at the site

No.	Management/Monitoring Measures	Target	Responsible party(ies)	* Time-frames/ Frequency
8.2	BRMO should undertake monthly internal compliance audits for all areas where rehabilitation is being implemented at the mine.  Audit to at least document compliance with this plan, as well as any other relevant provisions of the EMP revision approval by the DMR.	Full compliance with the provisions for mine site rehabilitation.	Environmental Officer	Monthly
8.3	BRMO should comply with all relevant environmental legal provisions concerning protected floral species, in executing any relevant provision of this plan.	Full legal compliance for the duration of rehabilitation efforts.	Environmental Officer	On-going
8.4	Post closure monitoring must be undertaken in accordance with the monitoring plan set out in Section <b>Error! Reference source not found.</b> of the EMPr.	Compliance with the monitoring plan.	Environmental Officer	On-going

\* All required actions to be implemented and completed within reasonable, practical, time-frames; unless time-frames otherwise expressly stated.

No.	Management/Monitoring Measures	Target	Responsible party(ies)	Time-frames
SFSF				
1.1	The SFSF must be capped, rehabilitated and closed in compliance with the relevant provisions of Section 11 of the Department of Water Affairs & Forestry Minimum Requirements for Waste Disposal by Landfill (2 <sup>nd</sup> Edition, 1998), or any future amendments thereto/ new legislation applicable to such.	Ultimate compliance with stated 'general closure' objectives for the Mine	Project Manager	Once-off. Within at least 24 months of last deposition /disposal thereto.
1.2	Engineering design drawings for capping and closure of the aforementioned facilities, as developed by a competent civil engineer, must be submitted to the competent authority in accordance with the requirements of the Environmental Authorisation and Water Use Licence.	Ultimate compliance with stated 'general closure' objectives for the greater Mine site	Project Manager, civil engineer	Once -off
1.3	The side slopes of all mine residue deposits should be shaped to at least 18°; unless otherwise assessed by a competent person in accordance with the legislation in place at the time.	Slope stability/safety, effective plant establishment and no signs of erosion.	Project Manager	Once-off

Table 1-2: Unique Structural and Infrastructural Rehabilitation Requirements for the SFSF				
No.	Management/Monitoring Measures	Target	Responsible party(ies)	Time-frames
1.4	Closed SFSF should be effectively fenced off to avoid access thereto by unauthorised parties, until such time as it is permanently stable.	Mine residue deposits made safe and inaccessible to the general public at closure. Mine residue deposits effectively fenced-off with controlled access.	Project Manager	Immediately. Once-off
Return Water- and Pollution Control Dams				
2.1	Any plastic liners and any other non-natural materials (e.g. piping, gantries, pump-houses), as well as any residues contained therein, should be removed for subsequent off-site recovery, re-use, recycling or disposal.	All artificially established structures and infrastructure removed from site. Records of waste manifest/safe disposal certificate(s).	Project Manager and Engineering manager	Once-off
2.2	Where relevant, dam walls should be flattened into the respective dam basins following 2.1 above.	Resultant topography conforming to that of the adjacent, pre-mining, land surfaces (Item 2-3, Table 1-1)	Project Manager	Once-off. Within 14 days of completing 2.1 above.
2.3	Proceed with relevant provisions of phases 2 through to 7 of Table 1-1 (i.e. once 2.1 and 2.2 above are appropriately implemented).	Ultimate compliance with stated end land-use-, ecological- and general closure objectives for the Mine.	Project Manager	Once-off. Within 14 days of completing 2.2 above.

### **1.6.1 BUILDINGS AND INFRASTRUCTURE**

Brick buildings and infrastructure can be put to beneficial use upon closure of the mine, and thus should not be removed if there is an adequate use for these buildings post-closure. This "adequate use" should be determined before final closure and rehabilitation measures are formally implemented.

If, however, any agreement is reached with the community and or any other organization to take over the occupation of one (1) or more buildings, then a formal agreement to that extent needs to be entered into and signed by all parties concerned. The DMR also needs to be alerted to this fact, and adequate legal arrangements need to be made in this regard. If various parties cannot reach agreement on the adequate use for these buildings, then these buildings too need to be demolished. All temporary buildings (pre-fabricated buildings) should be removed and their footprints rehabilitated.

### **1.7 CONCLUSIONS AND SUMMARY OF REHABILITATION PLAN**

This rehabilitation plan has taken into consideration areas that need to be rehabilitated on the site either at closure, or concurrently. The effective end result of rehabilitation should be to return the entire project area to as close to its previous pre-mining state as is possible and practical. All acceptable options for recycling and reuse should be considered before final disposal of any building materials, steel structures, electrical equipment or any associated equipment that could be reused, recycled or appropriately scrapped.

The rehabilitation plan is a working document and should change as seen fit, or necessary to achieve a better environmental outcome. The process of rehabilitation is diverse and various obstacles will be encountered during rehabilitation which may call for a revision in this plan. Maintenance of all rehabilitation must be on-going for a period of at least five years.

This maintenance will help to ensure that all rehabilitated areas, re-vegetated areas and alien invasive control is undertaken effectively. Rehabilitation of disturbed areas, as far as is practical, should proceed concurrently with the remainder of the operational period. Disturbed areas should be rehabilitated as quickly as possible. The requirements for such are similar for concurrent and closure rehabilitation.

