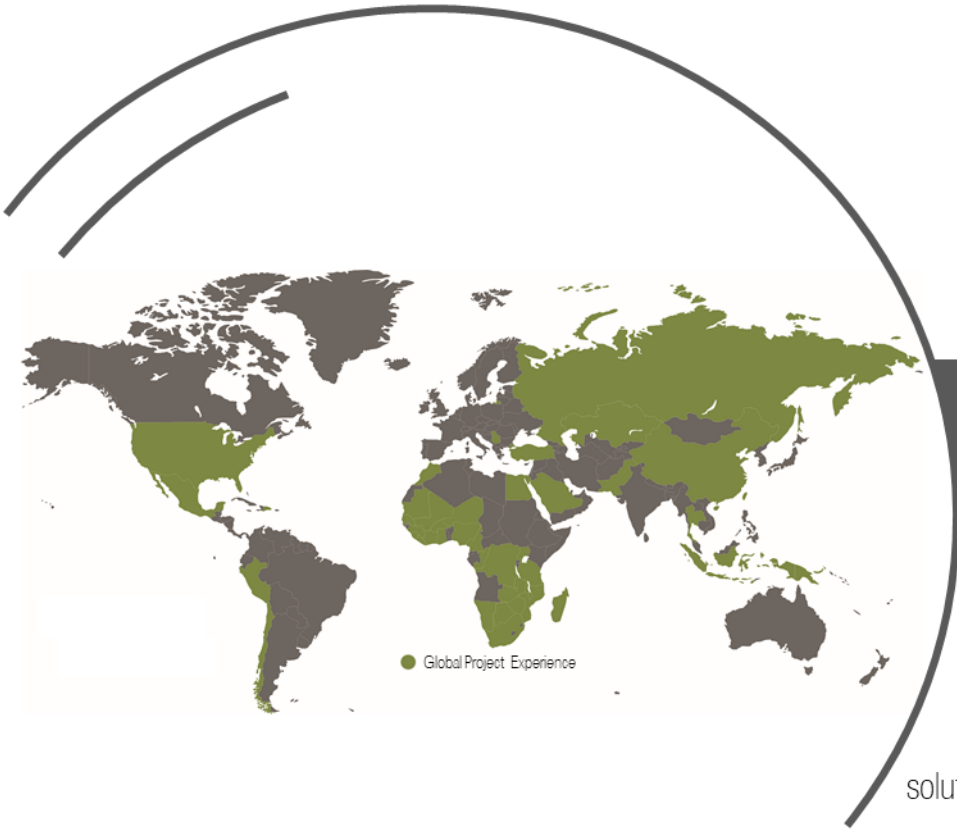

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Proposed Sand Mining Project in the Free State Province

Rehabilitation and Closure Plan

Prepared for:
Copper Sunset Sand (Pty) Ltd

Project Number:
COP6147

February 2020

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Report Type:	Rehabilitation and Closure Plan
Project Name:	Proposed Sand Mining Project in the Free State Province
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Name	Responsibility	Signature	Date
Brett Coutts	Report Compiler		February 2020
Claire Wannenburgh	Report reviewer		March 2020

EXECUTIVE SUMMARY

Copper Sunset Sand (Pty) Ltd (Copper Sunset) seeks to undertake a sand mining project in the Free State Province. The proposed project falls within an existing Mining Right Area (MRA) of the New Vaal Colliery which is owned by Seriti Resources. Therefore, Copper Sunset intends to obtain a Mining Permit through completing a Mining Permit Application (MPA) in terms of Section 27 of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). The proposed project triggers Listed Activities of the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R 982 of 4 December 2014 as amended by GN R 326 of 7 April 2017) promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The project triggered activities in Listing Notice 1 (GN R 983 of 4 December 2014 amended by GNR 327 of 7 April 2017) which thus requires a Basic Assessment (BA) process to be undertaken. This process requires a comprehensive public consultation process.

Legal Requirements

Section 41 (1) of the Mineral and Petroleum Resources Development Act (MPRDA) has been repealed and in terms of Section 24P of the NEMA, as amended, which provides that the holder of a Mining Right (MR) / Mining Permit must make financial provision for rehabilitation of negative environmental impacts. The financial provision must guarantee the availability of sufficient funds to undertake the following:

- Rehabilitation of the adverse environmental impacts of the listed or specified activities;
- Rehabilitation of the impacts of the related sand mining activities;
- Decommissioning and closure of the operations;
- Remediation of latent or residual environmental impacts which become known in the future;
- Removal of building structures and other objects; and/or
- Remediation of any other negative environmental impacts.

Locality and Property Details

The proposed project, which involves sand mining is located on the following properties:

- Maccaw Vlei No. 121, RE/121

The Copper Sunset Project is located in the northern part of the Free State Province and falls under the Sasolburg Magisterial District. The Copper Sunset Project is located approximately 2 km southeast of the town of Vereeniging.

Mining Operations and Rehabilitation

The Copper Sunset Operation will involve the mining of sand by means of strip mining due to the shallow depth of the deposit. The sand will be mined in strips of 30 – 35 m in width and

2.5 – 3 m in depth. An area of approximately 5 ha will be mined. The operation will make use of a fleet of bulldozers, wheel loaders, excavators, graders, articulated trucks, tipper trucks and a tractor loader backhoe. Once mining activities are complete, Seriti will then mine the area, thus it is anticipated that no rehabilitation will be undertaken, but in the event that this does not occur concurrent rehabilitation will be undertaken by Copper Sunset on the mined-out strips using the abovementioned equipment. The report will discuss rehabilitation interventions that will be undertaken to ensure there are management objectives set in the event that Seriti does not undertaken the mining of the proposed area.

If concurrent rehabilitation is undertaken, the mined-out strips will be contoured and the topsoil that was moved will be placed back into the mined-out area to resemble the pre-mining landscape and ensure that the site is free-draining. Despite the contouring and levelling an overall lowering of the topography is evident. Spreading of the topsoil is followed by the revegetation of the area with an indigenous grass seed mix.

The rehabilitation that will potentially be undertaken will be conducted in accordance with the approved EMPr and will be completed in rollover fashion. The success of the rehabilitation has direct or indirect effects on the rest of the ecosystem, as far as pollution of surface and groundwater, natural vegetation and animals are concerned. The financial provision estimate is included in this report. The aim of this report is to evaluate the rehabilitation processes that will potentially be implemented throughout the Life of Mine (LoM). The LoM is anticipated to be approximately 5 months.

Risk Assessment

Fifteen (15) unwanted events were identified. These unwanted events were ranked for risk based on the maximum reasonable severity should they occur and the likelihood of that specific severity/consequence occurring. This analysis was firstly done assuming that no controls are in place (i.e. the raw risk) and secondly considering current controls were in place and effective (i.e. residual risk).

No unwanted events were ranked as extremely intolerable, three (3) as highly intolerable, ten (10) as ALARP and two (2) ranked maintain as shown in Table 1-1 below.

Table 1-1: Raw Risk Ranking

Area number	Description	Number of unwanted events	Extremely Intolerable	Highly Intolerable	ALARP	Maintain
1	Mining Area	**2**	0	2	0	0
2	Infrastructure	**2**	0	0	2	0
3	General	**11**	0	1	8	2
Total		**15**	**0**	**3**	**10**	**2**

For the highest ranked events, additional “controls” should be put in place to reduce the level of risk. Deadlines for ensuring that the additional controls are put in place as well as accountabilities for doing so, should be defined.

The unwanted events were again assessed taking into consideration the current control measures.

The residual risks were ranked assuming the control measures are in place and effective. Table 1-2 below summarises the residual risks after taking the current control measures into consideration.

Table 1-2: Residual Risk Ranking

Area number	Description	Number of unwanted events	Extremely Intolerable	Highly Intolerable	ALARP	Maintain
1	Mining Area	**2**	0	0	2	0
2	Infrastructure	**2**	0	0	0	2
3	General	**11**	0	0	4	7
Total		**15**	**0**	**0**	**6**	**9**

Additional controls were recommended for the risks identified and these are listed in Section 10.3.

Financial Provision

The focus of this financial provision calculation is to estimate the cost of final closure and rehabilitation, including general surface rehabilitation of the disturbed areas in the event that Seriti does not mine the area to ensure that there are enough funds available for rehabilitation purposes.

The combination of concurrent rehabilitation and various other management measures will significantly reduce Copper Sunset’s environmental liabilities at closure. All areas included in the assessment were assumed to be the only areas Copper Sunset is liable for and no investigation was conducted to determine whether they are responsible for any additional areas.

The financial provision estimate based on the DMR calculation model is R 1,338,857.00. This includes P&Gs (12%) and a Contingency cost (10%) as per the DMR Guideline document. The DMR cost includes VAT at 15%.

Conclusion

To work towards achieving an environmentally safe and sustainably closed project area, concurrent rehabilitation is the key (dependant on whether or not New Vaal mines the area once Copper Sunset is complete with their sand mining operations).

Monitoring and maintenance for the areas impacted upon should be undertaken for two to three years after closure.

The key to the success of the project is defined by the implementation of the proposed mitigation measures, with a key focus on the following:

- Remove and control of alien invasive species;
- Management of topsoil resources; and
- Communication and integration of workflows between Seriti and Copper Sunset.

The aim of this RCP is to provide both Copper Sunset and the DMR with a comprehensive plan for the closure and post closure phases at the mine. It must be noted that the recommendations provided within this report are based on the assumptions that Copper Sunset will be responsible for the rehabilitation of the area once sand mining activities have been undertaken, assuming that Seriti does not mine the area. If Seriti do mine the area as planned, then recommendations contained within the New Vaal Closure and Rehabilitation Plan will take precedent over what has been recommended within this report.

Copper Sunset is committed to providing regular updates to the DMR on progress with respect sand mining activities undertaken within New Vaal.

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1 Introduction

Copper Sunset Sand (Pty) Ltd (Copper Sunset) seeks to undertake a sand mining project in the Free State Province. The proposed project falls within an existing Mining Right Area (MRA) of the New Vaal Colliery which is owned by Seriti Resources. Therefore, Copper Sunset intends to obtain a Mining Permit through completing a Mining Permit Application (MPA) in terms of Section 27 of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). The proposed project triggers Listed Activities of the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R 982 of 4 December 2014 as amended by GN R 326 of 7 April 2017) promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The project triggered activities in Listing Notice 1 (GN R 983 of 4 December 2014 amended by GNR 327 of 7 April 2017) which thus requires a Basic Assessment (BA) process to be undertaken. This process requires a comprehensive public consultation process.

1.1 Background

The Copper Sunset Operation will involve the mining of sand by means of strip mining due to the shallow depth of the deposit. The sand will be mined in strips of 30 – 35 m in width and 2.5 – 3 m in depth. An area of approximately 5 ha will be mined. The operation will make use of a fleet of bulldozers, wheel loaders, excavators, graders, articulated trucks, tipper trucks and a tractor loader backhoe. Once mining activities are complete, Seriti will then mine the area, thus it is anticipated that no rehabilitation will be undertaken, but in the event that this does not occur concurrent rehabilitation will be undertaken by Copper Sunset on the mined out strips using the abovementioned equipment. The report will discuss rehabilitation interventions that will be undertaken to ensure there are management objectives set in the event that Seriti does not undertaken the mining of the proposed area.

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The rehabilitation that will potentially be undertaken will be conducted in accordance with the approved EMPr, and will be completed in rollover fashion. The success of the rehabilitation has direct or indirect effects on the rest of the ecosystem, as far as pollution of surface and groundwater, natural vegetation and animals are concerned. The financial provision estimate is included in this report. The aim of this report is to evaluate the rehabilitation processes that will potentially be implemented throughout the Life of Mine (LoM). The LoM is anticipated to be approximately 5 months.

1.2 Locality

The proposed project, which involves sand mining is located on the following properties:

- Maccaw Vlei No. 121, RE/121

The Copper Sunset Project is located in the northern part of the Free State Province and falls under the Sasolburg Magisterial District. The Copper Sunset Project is located approximately 2 km southeast of the town of Vereeniging. Refer to Figure 1-1, for the Project Locality.

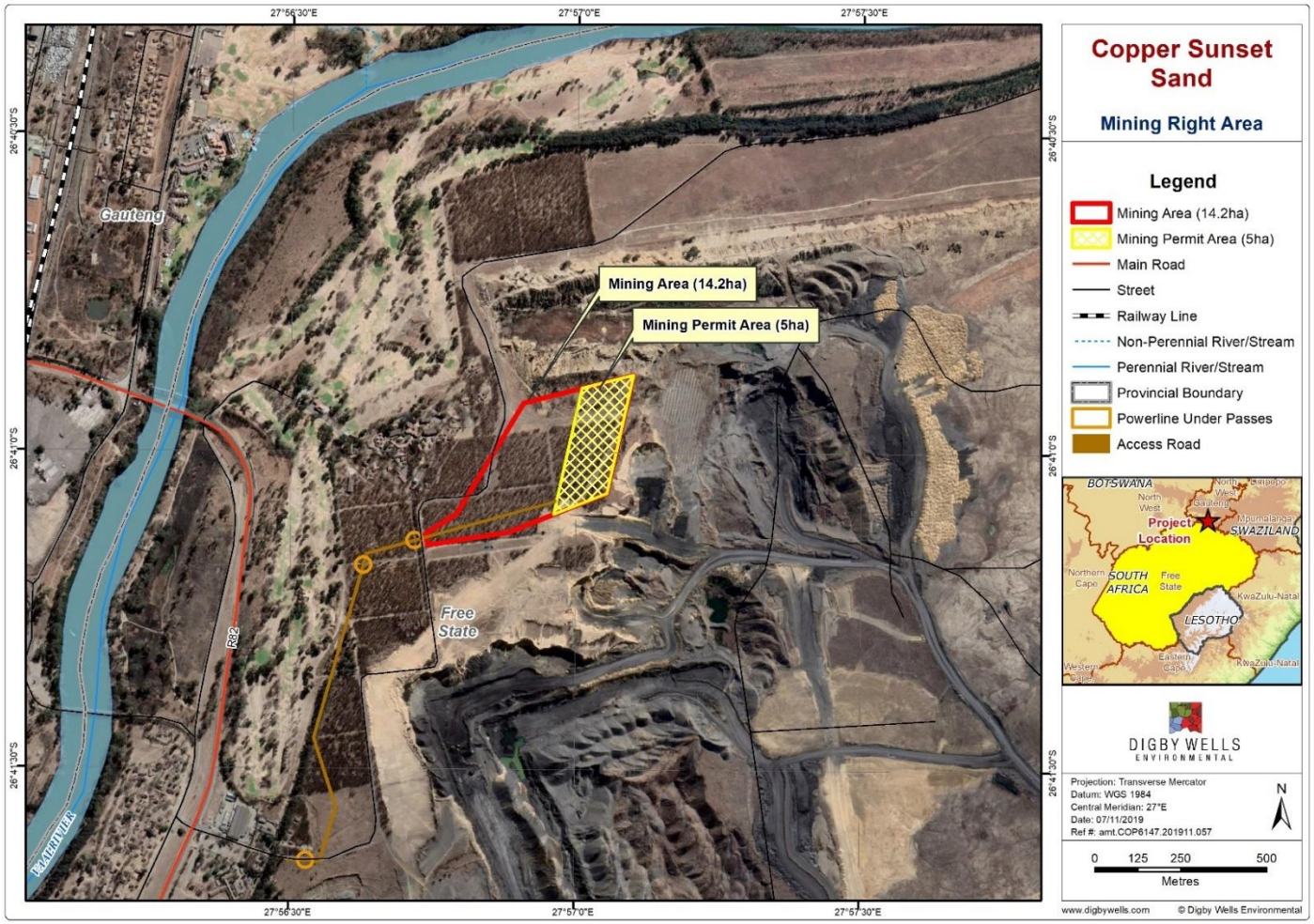

Figure 1-1: Local Setting

2 Details of Specialist

Brett Coutts is a Principal Consultant at Digby Wells. He received a Bachelor of Science and Honours degree in Zoology and Environmental Science from the University of Witwatersrand. Brett assists with the management and co-ordination of all relevant studies related to rehabilitation and certain ecological project. This includes the compilation of rehabilitation plans and undertaking of rehabilitation assessments.

In addition to this, Brett assists within the Biophysical Department with the management of specialist studies that are undertaken by the department and is also responsible for the compilation of the Geographic Information System (GIS) component of Biodiversity Land Management Plans (BLMP) and undertaking ecological assessments.

3 Plan Structure

The remainder of the RCP is structured as follows:

- Section 4 sets out the legal and regulatory framework for mine closure in South Africa and the Copper Sunset business requirements;
- Section 5 provides the closure process methodology;
- Section 6 provides assumptions and possible limitations;
- Section 7 outlines the general rehabilitation principles;
- Section 8 provides high level information on the receiving environment;
- Section 9 describes rehabilitation actions for the site;
- Section 10 provide the risk assessment undertaken;
- Section 11 details the closure objectives;
- Section 12 proposes a closure vision in the form of a final Land Use Plan (LUP);
- Section 13 details the closure EMP;
- Section 14 describes post closure monitoring and maintenance requirements;
- Section 15 gives a preliminary closure schedule;
- Section 16 presents the proposed concurrent rehabilitation;
- Section 17 details the financial provision for closure;
- Section 18 provides the conclusion and recommendations; and
- Section 19 provides the closing statement.

4 Regulatory Requirements

4.1 South African Legal Requirements

Section 41 (1) of the Mineral and Petroleum Resources Development Act (MPRDA) has been repealed and in terms of Section 24P of the NEMA, as amended, which provides that the holder of a MR / Mining Permit must make financial provision for rehabilitation of negative environmental impacts. The financial provision must guarantee the availability of sufficient funds to undertake the following:

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- Decommissioning and closure of the operations;
- Remediation of latent or residual environmental impacts which become known in the future;
- Removal of building structures and other objects; and/or
- Remediation of any other negative environmental impacts.

In addition to Section 24(P) of NEMA, the Financial Provisioning Regulations were promulgated on the 20 November 2015 (Government Notice No. 1147 published in GG 39425) (GN R1147). For the purposes of this report, the financial provision estimate and respective reports are in line with the requirements of the Financial Provisioning Regulations (GN R1147).

In addition, an amendment to the Financial Provision Regulations (2015) was gazetted on 17 January 2020. In terms of its transitional provisions, the regulations delay the date of having to comply with all provisions of the regulations, until 19 June 2021.

Regulation 11 of the Financial Provisioning Regulations, 2015 (GN R5527) requires a holder of a MR / Mining Permit to determine the quantum of the financial provision through detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required for:

- Annual rehabilitation as reflected in the ARP as per the minimum content prescribed by Appendix 3 of the Regulations;
- Final rehabilitation, decommissioning and closure as reflected in the RCP as per the minimum content prescribed by Appendix 4 of the Regulations; and
- The remediation of latent or residual environmental impacts including but not limited to the pumping and treatment of polluted or extraneous water, as reflected in an ERR, as per the requirements of Appendix 5 of the Regulations.

In addition, the second draft of the proposed changes to the Financial Provision Regulations was published for public comment on 17 May 2019 (GN R667). The proposed revision still requires the financial provision calculation to be based on actual costs and the supporting

documentation (i.e. ARP, RCP and ERR) to be compiled. For the purposes of this report, the Financial Provision Regulations (2015) were assumed relevant.

5 Terms of Reference

The terms of reference for the RCP is discussed below.

5.1 Environmental Risk Report

The Environmental Risk Assessment Report (ERR) must contain information that is necessary to determine the potential financial provision associated with the management of latent or residual environmental risks post closure. The ERR must address the following key aspects:

- A description of the risk including possible triggers and expected timeframes;
- An assessment of alternatives;
- Costing indicating the quantum of the liability; and
- Monitoring, auditing and reporting requirements.

5.2 Annual Rehabilitation Plan

In terms of the Financial Provision Regulations, an Annual Rehabilitation Plan (ARP) will need to be developed for the operation and must be linked to the action plan and schedule contained within the RCP. This report needs to document the progress made regarding rehabilitation for the past 12 months and plan for rehabilitation for the next 12 months. The content of such a report is summarised below:

- Review of concurrent rehabilitation activities;
- Assessment and review of objectives set and outcomes for the next 12 months;
- Scheduling, planning and budgeting for rehabilitation for the next 12 months, including areas to be rehabilitated, areas to be disturbed or planned to be disturbed, details of rehabilitation measures to be implemented and description of objectives and design criteria that have been adopted for the post 12 months;
- Assessment of rehabilitation from the past 12 months;
- Comparison of the next 12 months of rehabilitation compared to the past 12 months of rehabilitation;
- Evaluate and update the cost of rehabilitation for the 12-month period and for closure;
- Results of monitoring and risks identified; and
- Identification of shortcomings and how these will be addressed.

5.3 Rehabilitation and Closure Plan

The intent of the RCP is to ensure that it is aligned to the ERR and ARP and meets the minimum requirements stipulated by the relevant regulations. In general, the RCP must contain information relating to the following:

- Providing vision, objectives, targets and criteria for final rehabilitation;
- Legal and governance framework;
- Baseline environment, including social context, which will influence the closure objectives and post-mining land use;
- Assessment of post closure options that are practical and within the socio-economic and environmental opportunities;
- Motivation for the preferred closure option;
- Proposed final land use and mapping;
- On-going research on closure and rehabilitation options;
- Detailed description of assumptions made;
- Stakeholder issues and comments;
- Outline of design principles for closure, including designs and drawings of how the mine will develop, including a schedule of actions for final rehabilitation, which is linked to the mine works programme;
- Risk assessment approach and outcomes and linking this to closure activities;
- Detail on closure actions to mitigate/manage identified risks and describe the nature of residual risks that will need to be managed and monitored post closure;
- Scheduling, budget, roles and responsibilities to be assigned for final rehabilitation;
- Identification of knowledge gaps and how these will be addressed;
- Detail of full financial provision for the life of the project;
- Information on the organisational capacity to implement the rehabilitation plan;
- Auditable action plan for audits and update of the annual rehabilitation plan;
- Relinquishment criteria for infrastructure; and
- Outline of monitoring, auditing and reporting requirements.

6 Assumptions and Limitations

The following assumption is relevant to the RCP:

- The rehabilitation plan is based on the current information available;

- This report must be considered as a living document and will be updated as information becomes available, and as monitoring and rehabilitation progresses; and
- For post-closure monitoring costs, vegetation monitoring and maintenance will take place for a period of 2-3 years.

6.1 Mine Closure Overview

Historically, mine closure plans mainly focused on the environment and physical aspects, such as land rehabilitation and asset removal while overlooking the cultural, social and economic aspects. However, it is now accepted that considering closure at an early stage allows mining companies to reduce the level of dependency from communities with regards to economic benefits and community services.

Successful closure depends on setting, continually reviewing and validating and finally meeting closure goals that align with company and stakeholder requirements. There must be minimal residual risk to the company and the community should realise benefits that will continue to exist without further input from the company.

The vision of mine closure must be to ensure that a process is established to guide all decisions and actions during a mine's life such that:

- Future public health and safety are not compromised;
- Environmental resources are not subject to physical and chemical deterioration;
- The post-mining use of the site is beneficial and sustainable in the long-term;
- Any adverse socio-economic impacts are minimised; and
- The opportunity is taken to maximise socio-economic benefits.

It is recommended that the closure plan be revised as the mine production progresses; this will ensure the operation take advances in technology and rehabilitation methods into consideration.

Figure 6-1 below depicts a general approach to mine closure planning.

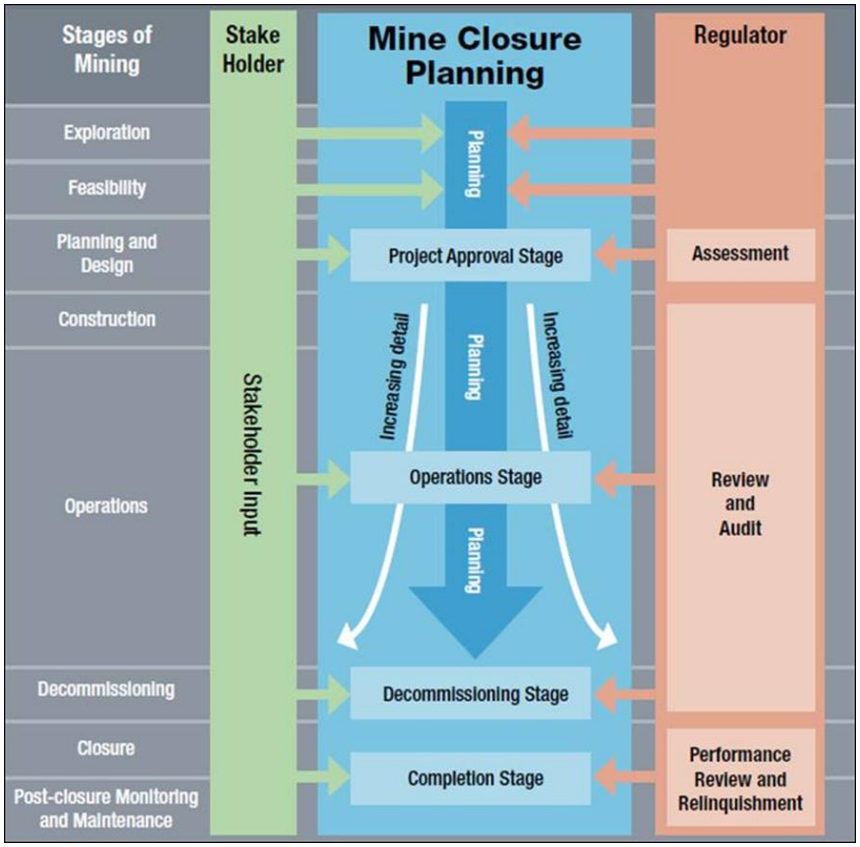

Figure 6-1: Integrating Stages of Mining and Mine Closure Planning

(Source: Integrated Mine Closure Toolkit, 2018)

6.2 Closure Design Principles

Mine closure is an on-going programme designed to restore the physical, chemical and biological quality or potential of air, land and water regimes disturbed by mining to a state acceptable to the regulators and to post mining land users. The activities associated with mine closure are designed to prevent or minimise adverse long-term environmental impacts and to create a self-sustaining natural ecosystem or alternate land use based on an agreed set of objectives. The objective of mine closure is to obtain legal (government) and community agreement that the condition of the closed operation meets the requirements of those entities, whereupon the companies' legal liability is terminated.

Rehabilitation can be divided into two different streams, namely concurrent rehabilitation and final rehabilitation. Concurrent rehabilitation must continue to be carried out along with mining. Concurrent rehabilitation activities must decrease the final closure costs that the mine will carry at the time of closure. This concurrent rehabilitation must be carried out within the context of the approved Environmental Management Programme (EMPr) as well as the RCP. Final rehabilitation will be carried out once the mine goes into its decommissioning and closure phase.

The primary concerns for decommissioning and rehabilitation are to ensure public safety and health and environmentally stable conditions compatible with the surrounding environment, and consequently minimise the environmental impacts caused by mining. The overall objective is to have socially, economically, and environmentally sustainable development. The objectives of mine closure as set out in the policies of the Department of Mineral Resources (DMR) are:

- A description of the closure objectives and how these relate to the mine operation and its environmental and social setting;
- A plan contemplated in regulation 2(2) showing the land or area under closure;
- A summary of the current regulatory requirements and conditions for closure;
- A summary of studies that address the details of any potential residual or latent impacts resulting from the operation such as groundwater;
- A summary of the progressive rehabilitation already undertaken by the mine;
- A description of the methods to decommission each mining component and the mitigation or management strategy proposed to avoid, minimise and manage residual or latent impacts;
- Details of any long-term management and maintenance expected;
- Details of the financial provision for monitoring, maintenance and post closure management; and
- A plan describing the final land use proposal and arrangement for the site.

6.3 Closure Objectives

Closure and rehabilitation is a continuous series of activities that begin with planning prior to the project's design and construction and end with achievement of long-term site stability and the establishment of a self-sustaining ecosystem. Not only will the implementation of this concept result in a more satisfactory environmental outcome, but it will also reduce the financial burden of closure and rehabilitation.

6.3.1 Copper Sunset's Principles for Mine Closure

The guiding principles that have been adopted to guide the development of the RCP as well as subsequent plans are as follows:

- The closure measures stipulated in the closure plan must limit the potential adverse effects of the closed mining site on the receiving environment, and that the quality of life of the surrounding communities is not severely compromised after closure;
- An acceptable residual risk outcome is sought;
- The closure plan must be progressively developed and refined as information becomes available, resulting in an appropriate and up-to-date closure plan at the time of closure;

- The closure measures must be sustainable under foreseeable natural events; and
- Priority must be given to the use of locally available natural materials and/or vegetation as opposed to imported/synthetic material and/or exotic vegetation to improve/add to the 'natural' feel of the reclaimed facility.

7 General Rehabilitation Principles

The implementation of the above described actions has some commonalities in the manner in which they will be carried out. This section aims to describe general actions and principles that must be followed for the implementation of rehabilitation tasks.

7.1 Soils

Care must be taken when rehabilitation activities are undertaken to ensure that soil resources at the Copper Sunset Operation are protected and not lost through erosion, compaction or contamination. This is described below.

7.1.1 Erosion Prevention and Correction

Soil erosion might pose a problem during rehabilitation when vegetation cover is still establishing. At the Copper Sunset Operation minor soil erosion may be an issue on some of the road surfaces and in rehabilitated areas. The following management actions should be followed to prevent/reduce soil erosion:

- Ensure proper storm water management designs are in place;
- When erosion occurs, corrective actions must be taken to minimise any further erosion from taking place;
- Use stoloniferous grasses such as *Cynodon dactylon* in the species mix;
- If erosion has occurred, usable soil should be sourced and replaced and shaped to reduce the recurrence of erosion; and
- Keep grazers out of the rehabilitation areas while grass cover is establishing.

7.1.2 Soil Compaction Prevention

Compaction should be limited as it reduces the effectiveness of replaced soils by restricting the rooting depth of vegetation. This should be completed through the following guidelines:

- Heavy machinery should not be used to spread and level soils during replacement. Instead, the truck and shovel method should be used (since it causes less compaction than, for example, a bowl scraper);
- When using trucks to deposit soils, the full thickness of the soil required can be placed in one lift. This does, however, require careful management to ensure that the correct volumes of soil are replaced. Alternatively, end-tipping could be instituted so the trucks depositing the soil do not drive over tipped soils thereby increasing compaction;

- The soil piles deposited by the trucks will have to be smoothed before revegetating the area;
- Only the designated access routes are to be used to reduce any unnecessary compaction;
- Topsoil should be replaced as soon as possible;
- Compacted areas are to be ripped (200 mm) to loosen the soil structure and vegetation cover re-instated; and
- Usable soil is to be moved when the soil is dry, as to reduce compaction.

7.2 Re-vegetation Practices

The overall objectives for the re-vegetation of reshaped and top-soiled land are to:

- Prevent erosion;
- Avoid soil loss;
- Restore the land to the agreed land capability;
- Reduce sedimentation into aquatic ecosystems such as rivers and wetlands;
- Re-establish eco-system processes (succession) to ensure that a sustainable land use can be established without requiring fertilizer additions; and
- Restore the biodiversity of the area as far as possible.

Hand sowing has been used successfully at the old Copper Sunset Operation in the past, thus far and therefore is a continued option for seeding of the new proposed sand mining area. Seeding is generally most successful when done at or immediately after rain and into freshly prepared fine-tilled seedbeds. To stimulate germination, water retention in the seed zone is essential and can be aided by the use of light vegetation mulches.

Table 7-1 is the grass seed mix advised for the rehabilitation areas of the Copper Sunset site, highlighting the original seed mix as well as additional species that are now suggested for the site.

Table 7-2 may also be consulted for grass species to increase the species richness of the rehabilitated vegetation. The end land use is expected to be grazing therefore grasses suitable for grazing was included in the seed mix.

Table 7-1: Grasses for Rehabilitation

Species name	Common name	Properties	Grazing potential	Grazing status	Sowing rate (kg/ha)	% mix
Original species mixture						
Chloris gayana	Rhodes grass	Short-lived perennial, stabiliser	High grazing value	Decreaser	4	18
Digitaria eriantha	Fingergrass	Perennial	High grazing value	Decreaser	8	36
Cynodon dactylon	Couch grass	Mat-forming, stabiliser	High grazing value	Increaser 2	4	18
Eragrostis tef	Teff	Annual, pioneer	High grazing value		2	9
Additional Species						
Themeda triandra	Red Grass	Perennial	High grazing value	Decreaser	2	9
Eragrostis curvula	Weeping love grass	Perennial	Low grazing value	Increaser 2	2	9
Total					**22**	**100%**

Table 7-2: Naturally Occurring Grasses in the Local Vegetation Types

Central Free State Grassland	*Aristida adscensionis; Aristida congesta; Cynodon dactylon; Digitaria argyrograpta; Elionurus muticus; Eragrostis chloromelas; Eragrostis lehmanniana; Eragrostis obtusa; Eragrostis plana; Eragrostis curvula; Eragrostis trichophora; Heteropogon contortus; Panicum stapfianum; Setaria sphacelata; Themeda triandra; Tragus keolerioides; Cymbopogon pospischilii.*

7.3 Pollution Control

Ensure hydrocarbon pollution is minimized. Vehicles and heavy machinery used during closure and rehabilitation should be serviced and checked on a regular basis to prevent leakages and spills of hydrocarbons.

7.4 Weed Control

Invasion of alien plant species erodes the natural capital of ecosystems, compromises their stability and is a growing problem in South Africa (Richardson and van Wilgen, 2004).

Alien plant species invasion is significant on site with alien bushclumps (old oak plantations) of woody species covering a large portion of the area.

Invasion by destructive alien plant species erodes the natural capital of ecosystems, compromises their stability and is a growing problem in South Africa (Richardson and Van Wilgen, 2004). Species such as *Acacia mearnsii* (Black Wattle) and *Eucalyptus* spp. out-compete native species, forming dense mono-specific stands. This reduces the area available for potential plant Species of Special Concern (SSC), as well as land for grazing by domestic and wild animals.

Certain species have different alien invasive categories for different provinces in South Africa. Table 7-3 lists the alien plant species that were recorded on within and surrounding the project area, including invasive categories for those species that have been recognised as invasive.

Table 7-3: Alien Plant Species Recorded on Site

Family	Species Name	Common Name	NEMBA
Simaroubaceae	*Ailanthus altissima*	Tree of Heaven	1b
Solanaceae	*Datura Ferox*	Apple Thorn	1b
Asteraceae	*Mikania sp*	Mile a Minute	Prohibited
Asteraceae	*Senecio sp*	Ragot	Prohibited
Amaranthaceae	*Alternanthera pungens*	Paper Thorn	Weed
Fagaceae	*Quercus Robustus*	English Oak	Not listed (Alien Tree)
Salicaceae	*Populus deltoides*	Poplar	No listed (Alien Tree)
Pinaceae	*Pinus sp*	Pine sp	Certain species are listed
Ulmaceae	*Ulmus sp*	Elm sp	Not listed
Solanaceae	*Solanum sp*	Tree tomato/giant devil fig/sliver-leaf bitter apple/bugweed/Jerusalem cherry/potato creeper/wild tomato	All species listed as 1b

8 Receiving Environment

8.1 Climate

The area experiences a typical Highveld climate with marked seasonality in the distribution of rainfall. The mean average rainfall is 641.7mm, which mostly occurs in the summer months of October to March. Thunderstorms are frequent during the rainy season and are usually characterised by lightning, heavy rain, strong winds and sometimes hail. Drought conditions

can occur during winter. The maximum temperatures range from 27.8°C in January to 17.7°C in July, with minimum temperatures ranging from 15.5°C in January to near 0°C in June and July. Frost is common and occurs on average between the middle of May and the beginning of September. The most prevalent strong wind direction is from the north and east during the year and particularly during the summer months.

8.2 Vegetation

Copper Sunset Operation falls within the Grassland Biome with the regional vegetation characterised by the Central Free State Grassland (Gh 6) (Mucina and Rutherford, 2006).

8.2.1 Central Free State Grassland (Gh6)

This vegetation type is characterised by undulating plains supporting short grassland naturally dominated by *Themda triandra*, *Eragrostis curvula* and *E. chloromelas* when degraded. Dwarf karoo bushes establish in severely degraded clayey bottomlands. Overgrazed and trampled low-lying areas with heavy clayey soils are prone to Acacia karoo encroachment.

This vegetation is classified as Vulnerable. Only small portions enjoy statutory conservation such as Willem Pretorius, Rustenfontein and Koppies Dam Nature Reserves. Almost a quarter of the area has been transformed either for cultivation or by dams. Refer to

Table 7-2, for dominant grass species that occur within this vegetation type.

Table 8-1: Naturally Occurring Grasses in the Local Vegetation Types

Central Free State Grassland	*Aristida adscensionis; Aristida congesta; Cynodon dactylon; Digitaria argyrograpta; Elionurus muticus; Eragrostis chloromelas; Eragrostis lehmanniana; Eragrostis obtusa; Eragrostis plana; Eragrostis curvula; Eragrostis trichophora; Heteropogon contortus; Panicum stapfianum; Setaria sphacelata; Themeda triandra; Tragus keolerioides; Cymbopogon pospischilii.*

8.3 Quaternary Catchments

The proposed sand mining operations is located within the quaternary catchment C22F (drains directly into the Vaal River).

8.3.1 Wetlands

No wetlands have been identified within the project area.

9 Rehabilitation and Closure Measures

9.1 Access Roads

Various access roads will be utilised on site to access mining areas. The following rehabilitation actions were necessary:

- Rip the soil to reduce compaction;

- Cover with topsoil that has been stockpiled;
- Fertilise if necessary;
- Reseed with indigenous grass species (see Table 7-1);
- Prevent vehicle access to these areas; and
- Remove all existing alien invasive species.

9.1.1 Main Roads

- Main access roads will stay on site for third-party utilisation.

9.2 Mining Areas

Topsoil will potentially be replaced if mining by New Vaal is not undertaken, which then means Copper Sunset will need to undertake the rehabilitation of the site. Below are high level actions that should be adopted:

- Fertilise what was necessary;
- Seed with indigenous grass species (see Table 7-1); and
- Remove all alien invasive species existing at the time.

10 Risk Assessment

The objective of the risk assessment is outlined in the Financial Provisioning Regulations, 2015. The objective 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.

10.1 Risk Assessment Methodology

Risk assessment is the overall process of risk identification, risk analysis and risk evaluation. A baseline hazard identification and risk assessment (HIRA) was completed as part of the financial provision update. The baseline HIRA is based on a qualitative method. The following process steps were taken:

- A general discussion on hazards and “driving forces” was used to determine things that could “go wrong” during the mine closure;
- The boundaries of the project were defined;
- Areas within the mining area were defined;

- For each of the areas in the process:
  - Potential unwanted events were identified;
  - Current controls for each unwanted event were identified and recorded;
  - The most likely severity, should the event occur, and likelihood of the event occurring were then estimated;
  - Based on this, the level of risk was estimated using the risk matrix; and
  - For the Highly and Extremely Intolerable events, additional "controls" were recommended to reduce the level of risk.

The four levels of risks are classified as shown in Table 10-1 below.

Table 10-1: Risk levels

Colour	Descriptor	Action	Sign-off
	Extremely Intolerable	Immediate Action	General Manager
	Highly Intolerable	Short term action required	Senior Management
	ALARP[1]	Heightened Action	Section Manager
	Maintain	Ensure levels of control	Supervisor

The six types of risk have been outlined and included in the risk matrix.[2] These are, in no order of priority:

- Health and Safety Risk;
- Natural Environment Risk;
- Social Risk;
- Reputational Risk;
- Legal Risk; and
- Financial Risk.

A qualitative Severity and Likelihood Matrix was used during the risk estimation as shown below in Table 10-2.

The severity and likelihood definitions are provided in Table 10-2. Once the severity and likelihood of the unwanted events had been rated, the risk rank was determined using the risk matrix. This matrix is not a simple multiplication tool; risk rank is skewed so that emphasis is

[1] As low as reasonably practicable

[2] HB 436:2004, Risk Management Guidelines, Companion to AS/NZS 4360:2004

placed on high severity events, rather than on high likelihood events. The likelihood and consequence definitions were reviewed by the risk assessment team and accepted as being relevant for this risk assessment.

Table 10-2: Risk Estimation Matrix

	ENVIRONMENTAL RISK MATRIX							Norms and Standards (N)	Effect on Work Image (WI)	Effect on Environment (E1)	Effect on Social and Ecosystem Processes (E2)	Public Reaction (P)	Legal Implications (L)
SEVERITY	**A**	Highly Intolerable	Highly Intolerable	Extremely Intolerable	Extremely Intolerable	Extremely Intolerable	Extremely Intolerable	Consistently outside of the norm or standard	Reputation impacted with majority of key stakeholders.	Irreversible changes to abundance/ biomass in affected area. Loss of ecological functioning with little prospect of recovery	**Major**, potential for irreversible change to valued flora and fauna, ecosystem processes and structure, including ecosystem services.	Severe national pressure to cease business. Serious public or media outcry (international coverage).	Referral to the National Prosecuting Authority. Potential investigation by authority with prosecution and fines.
	B	ALARP	Highly Intolerable	Highly Intolerable	Extremely Intolerable	Extremely Intolerable	Extremely Intolerable	Largely deviating from the norm or standard	Reputation impacted with significant number of key stakeholders	Substantial reduction of abundance/ biomass in affected area. Eventual recovery of ecological systems possible, but not necessarily to same pre-impact conditions	**Major**, potential for unacceptable, longer term change to valued flora and fauna, ecosystem processes and structure, including ecosystem services.	Severe local and national public or press reaction.	Withdrawal of permit.
	C	ALARP	ALARP	Highly Intolerable	Highly Intolerable	Extremely Intolerable	Extremely Intolerable	Frequent and significant deviations from the norm or standard	Reputation impacted with some stakeholders	Reduction of abundance/biomass in affected area. Limited impact to local biodiversity without significant loss of pre-impact functioning	**Moderate**, potential for unacceptable, short term change to valued flora and fauna, ecosystem processes and structure, including ecosystem services	Local public or press reaction.	Notification of intent to issue a directive.
	D	Maintain	Maintain	ALARP	ALARP	Highly Intolerable	Highly Intolerable	Occasional and minor deviation from the norm or standard	Reputation impacted with small number of people	Minimal reduction of abundance/biomass in affected area. Limited impact to local biodiversity without significant loss of pre-impact functioning.	**Moderate**, potential for acceptable, longer term change to valued flora and fauna, ecosystem processes and structure, including ecosystem services	Minor local public or media reaction.	Departmental enquiry and correspondence.
	E	Maintain	Maintain	Maintain	ALARP	ALARP	ALARP	Rare and minimal deviation from the norm or standard	No discernible impact on reputation	Reduction of the abundance/biomass of flora and fauna in affected area. No permanent changes to biodiversity or exposed ecological system	**Minor**, potential for acceptable, short term change to valued flora and fauna, ecosystem processes and structure, including ecosystem services..	Little or no reaction Public concern restricted to local complaints.	Complaints from the public and/or regulator.

ENVIRONMENTAL RISK MATRIX							Norms and Standards (N)	Effect on Work Image (WI)	Effect on Environment (E1)	Effect on Social and Ecosystem Processes (E2)	Public Reaction (P)	Legal Implications (L)
F	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain	Consistently within the norm or standard	No discernible impact on reputation	Possible incidental impacts to flora and fauna in locally affected area. No ecological consequences	**Minor,** potential for incidental and/or transient changes to valued flora and fauna, ecosystem processes and structure, including ecosystem services	None.	No legal implications.

	LIKELIHOOD					
	G	***H***	***I***	***J***	***K***	***L***
	Highly unlikely	***Rare***	***Low likelihood/ Unlikely***	***Probable/ Possible***	***Can happen/ Likely***	***Regular/ Almost Certain***
Percentage (%)	***<0.1%***	***0.1 - 0.4%***	***5 - 14%***	***15 - 49%***	***50 - 74%***	***75 - 100%***
Descriptor	Practically impossible, not foreseen to occur	Conceivable under exceptional circumstances	Only remotely possible (has happened somewhere)	Unusual but possible (can happen)	Quite possible	Is the most likely and expected to happen (has and foresee it to happen again)
	Once in more than 10 000 years.	Once in 1 000 years.	Once in 100 years.	Once every 10 years	Once every year	More than once a year

10.2 Risk Analysis Results

Potential unwanted events for and during mine closure were identified and discussed. All unwanted events are listed in Table 10-3.

Fifteen (15) unwanted events were identified. These unwanted events were ranked for risk based on the maximum reasonable severity should they occur and the likelihood of that specific severity/consequence occurring. This analysis was firstly done assuming that no controls are in place (i.e. the raw risk) and secondly considering current controls were in place and effective (i.e. residual risk).

No unwanted events were ranked as extremely intolerable, three (3) as highly intolerable, ten (10) as ALARP and two (2) ranked maintain as shown in Table 10-3 below.

Table 10-3: Raw Risk Ranking

Area number	Description	Number of unwanted events	Extremely Intolerable	Highly Intolerable	ALARP	Maintain
1	Mining Area	**2**	0	2	0	0
2	Infrastructure	**2**	0	0	2	0
3	General	**11**	0	1	8	2
Total		**15**	**0**	**3**	**10**	**2**

For the highest ranked events, additional “controls” should be put in place to reduce the level of risk. Deadlines for ensuring that the additional controls are put in place as well as accountabilities for doing so, should be defined.

The unwanted events were again assessed taking into consideration the current control measures. The residual risks were ranked assuming the control measures are in place and effective. Table 10-4 below summarises the residual risks after taking the current control measures into consideration.

Table 10-4: Residual Risk Ranking

Area number	Description	Number of unwanted events	Extremely Intolerable	Highly Intolerable	ALARP	Maintain
1	Mining Area	**2**	0	0	2	0
2	Infrastructure	**2**	0	0	0	2
3	General	**11**	0	0	4	7
Total		**15**	**0**	**0**	**6**	**9**

Additional controls were recommended for the risks identified and these are listed in Section 10.3. Table 10-5 below gives a summary of the potential risks identified.

Table 10-5: Summary of Potential Risks

Area	Hazard	Discussion	Primary Risk Category	Raw Risk	Residual Risk
Mining Area	Possibility of not sufficiently rehabilitating the mining area leading to environmental impacts remaining un-mitigated.	Closure material balance not being sufficient to implement closure actions or to achieve relinquishment requirements.	Natural Environment	Highly Intolerable	ALARP
General	Possibility of inadequate or no funds to implement closure actions, resulting in legal obligations not being discharged.	Underestimate of closure quantum, insufficient funds are available to mitigate impacts or that funds have not been appropriately provisioned for closure.	Financial	Highly Intolerable	ALARP
Mining Area	Possible pooling/ ponding of water.	Surface water runoff not reaching streams and rivers. Loss of surface water quantity.	Natural Environment	Highly Intolerable	ALARP
General	Possibility of ineffective planning for mine closure.	Unidentified environmental impacts are not mitigated as a result of closure actions that are not planned.	Natural Environment	ALARP	ALARP
General	Drastic changes in legislative requirements.	Copper Sunset incurring additional closure and rehabilitation costs.	Financial	ALARP	ALARP

Area	Hazard	Discussion	Primary Risk Category	Raw Risk	Residual Risk
General	Possibility of failing to control alien invasive species on rehabilitated land.	Loss of biodiversity.	Natural Environment	ALARP	ALARP
Infrastructure (Offices)	Possible pollution of soils and water resources.	Potential of contaminated leachate emanating from the workshop and hardstand areas.	Natural Environment	ALARP	Maintain
Infrastructure (Offices)	Possible collapse of remnant infrastructure which could lead to human injury or fatality.	The withdrawal of planned maintenance on any structures that are left for 3rd party post closure use, may result in the integrity of the structures deteriorating to the point where they represent a H&S risk to users, if the 3rd party does not implement its own maintenance regime	Health & Safety	ALARP	Maintain
General	Potentially requiring registration of land as contaminated land and requiring remediation.	Operational activities may result in soil being considered contaminated under S8 of Chapter 4 of NEMWA.	Natural Environment	ALARP	Maintain
General	Potential additional closure liabilities and potentially different closure actions required to rehabilitate and close the mine.	Future mining requirements may include infrastructure that is not currently considered in planning.	Financial	ALARP	Maintain

Area	Hazard	Discussion	Primary Risk Category	Raw Risk	Residual Risk
General	Possible delaying of closure once LoM reached.	Possible vandalism and interference with infrastructure, which may lead to more costly remedial measures being implemented when closure actions are undertaken.	Financial	ALARP	Maintain
General	Might not be able to demonstrate to the authorities that the relinquishment criteria have been achieved.	Possibility that Copper Sunset does not achieve mine closure.	Legal & Reputational	ALARP	Maintain
General	Possibility of civil unrest for those that lose employment.	Labour expectations are not achieved. No alternative livelihood opportunities.	Legal & Reputational	ALARP	Maintain
General	Potential negative impact on local livelihoods.	Failure to implement the final land use plan.	Natural Environment	Maintain	Maintain
General	Possible dust and noise generation during decommissioning and closure of the mine.	Nuisance dust and noise to community.	Health & Safety	Maintain	Maintain

10.3 Additional controls to be put into place

Below provides some of the additional controls that could be implemented:

- Ensure rehabilitation is conducted using a clear plan for the mined area's end land use. Consider post-mining landscape designs. Ensure rehabilitation contractor is aware of rehabilitation requirements (include in contract).
- Continuous monitoring and maintenance of rehabilitated areas. Conduct rehabilitation as per the mine's rehabilitation plan.
- Ensure mine rehabilitation and closure funds are available to implement the final Land Use Plan. Annually update financial provision liabilities. Conduct annual rehabilitation where possible.
- Establish an alien invasive control/eradication programme and monitor alien invasive species during the post closure phase.

11 Closure Objectives

The closure objectives for Copper Sunset Operation have been divided into eight (8) categories as follows:

- **Physical stability** - To remove and/or stabilise surface infrastructure, rehabilitated land according to the planned land use plan after closure.
- **Environmental quality** - To manage the impact of physical effects and chemical contaminants on the environment such that the environmental quality is not adversely affected after closure.
- **Health and safety** - To limit, as far as reasonably possible, health and safety risks to humans accessing the site after closure.
- **Land capability/land-use** - To re-instate the pre-development land use through the implementation and maintenance of the post closure land-use plan.
- **Aesthetic quality** - To leave behind a site that gives an acceptable overall aesthetic appearance.
- **Biodiversity** - To encourage the re-establishment of native and/or appropriate flora and fauna on the reclaimed mine site such that the biodiversity is largely re-instated by natural succession over time.
- **Stakeholder Management** - To follow an appropriate stakeholder engagement process with all interested & affected parties and authorities.

12 Draft Land Use Plan

The final LUP is essentially the end land use to which Copper Sunset Operation would like to return the land affected by mining activities. The closure objectives set as part of the mine

closure planning process aims to ensure that the final LUP is achieved and that the area is sustainable in the long-term from an environmental and social point of view. The aim is to restore the mining area land to grazing and this should be achieved based on the minimal level of disturbance that has occurred.

13 Closure Environmental Management Plan

13.1 Management and Mitigation Measures

Table 13-1 details the EMP for the decommissioning phase of Copper Sunset Operation to ensure that risks identified at specific areas are mitigated or prevented through appropriate and practical management measures. The rehabilitation required at each of the area is presented in Section 9. The management measures for the post closure phase are detailed in Section 14.

Table 13-1: Closure Environnemental Management Plan (CEMP)

Copper Sunset Mining Area	Aspect	Objectives	Management & Mitigation Measures	Control Type
Surface Infrastructure	Aesthetic quality	To ensure the rehabilitated landscape replicates the landscape functionality of surrounding non-mining related undisturbed areas and which is aligned to the LUP.	Dismantle and demolish surface infrastructure with no beneficial re-use; Decontaminate demolished steel infrastructure for off-site salvage/disposal; and Dispose concrete and related demolition at an appropriate facility.	Preventative
	Soil and Biodiversity	To reduce possible adverse chemical effects on the receiving biophysical environment. To encourage re-establishment of suitable vegetation growth with particular attention to groundcover.	Once infrastructure have been demolished, removed and disposed of at waste site and/or transferred to a third party, the following rehabilitation measures will be implemented: Shape and profile area to be free draining Rip all compacted infrastructure pads to alleviate compaction; and Implement general surface rehabilitation on footprint areas as per detailed rehabilitation plan.	Preventative
	Fauna	To ensure natural faunal species re-establish in the relinquished mine area.	All fences within the area that are not associated with protecting rehabilitated sites should be removed post closure.	Corrective

Copper Sunset Mining Area	Aspect	Objectives	Management & Mitigation Measures	Control Type
	Surface Water and Topography	To re-instate natural drainage lines to limit erosion and sediment build up within local river courses. To ensure rehabilitated areas roughly emulate the surrounding surface topography.	Shape and profile rehabilitated areas to be free draining.	Preventative
Access Roads	Biodiversity	To ensure that erosion of rehabilitated roads do not occur. To encourage re-establishment of suitable vegetation growth with particular attention to groundcover.	Implement/improve erosion measures along rehabilitated roads; Shape the area to facilitate drainage. Rip roads in order to create suitable conditions for vegetation establishment; and Ensure re-instatement of vegetation cover on rehabilitated roads as per the end LUP.	Preventative
	Soil	To reduce possible adverse chemical effects on the receiving biophysical environment.	Clean up material, such as hydrocarbons if spilled.	Corrective
	Social	To prevent community unrest.	Continue consultation with I&APs and stakeholders to ensure that their needs and expectations are considered regarding the usage of certain roads.	Preventative

Copper Sunset Mining Area	Aspect	Objectives	Management & Mitigation Measures	Control Type
	Topography	To re-instate natural drainage lines to limit erosion and sediment build up within local river courses. To ensure rehabilitated areas roughly emulate the surrounding surface topography. Minimise the effects of surface subsidence.	Shape and profile rehabilitated areas to be free draining as informed by detailed post-mining rehabilitation designs.	Corrective
	Fauna	To ensure natural faunal species re-establish in the relinquished mine area.	All fences within the area that are not associated with protecting rehabilitated sites should be removed post closure.	Preventative

13.2 Rehabilitation Strategy

13.2.1 Soil Management

Soil management measures include:

- The rehabilitated area will be profiled to replicate the natural landform;
- When there is insufficient soil material for use, select suitable sub surface materials (i.e. those that are neither saline nor sodic) to use as a substitute for soil when covering rehabilitated areas; and
- Ensuring organic content is sufficient to sustain microbial activity, encourage infiltration, limit runoff and improve soil stability. Mulch with grass clippings (cut when seed content is at its highest) as an attempt to provide a seed bank can be put back onto rehabilitated areas.

13.2.2 Shaping and Levelling

The area will be shaped and levelled back to original topography and will be made free draining.

13.2.3 Soil Compaction Alleviation/Reduction

In order to alleviate or reduce soil compaction the following will take place:

- All disturbed footprints and heavily compacted areas (hard park areas, access roads) will be ripped;
- Soil will be ripped when moist to allow for maximum alleviation of compaction; and
- Soils will be moved and/or replaced when they are dry to minimise compaction

13.2.4 Soil Amelioration

Soil amelioration will be done as follows:

- Following de-compaction, an acceptable seedbed will be produced through surface tillage;
- Soil will be sampled and analysed once placed on rehabilitated areas; and
- Fertiliser will be applied to raise the soil nutrient content to the desired levels and maintenance will continue.

13.3 Erosion Control

The following will be done as part of erosion control on rehabilitated land:

- Unnecessary disturbance and vegetation removal will be avoided and prevented;
- Pre-development drainage patterns will be reinstated as far as possible; and

- Rehabilitated areas will be monitored for erosion.

13.3.1 Vegetation Species Selection

In terms of vegetation, the following will be done:

- Rehabilitated areas will be vegetated as far as possible; and
- Grass will germinate from the mulching.

Refer to Section 7.2 for grass species that should be utilised for rehabilitation.

13.3.2 Vegetation Establishment

In order to ensure vegetation establishment, the following will be done:

- Rehabilitated areas will be prepared;
- Seeds will be sowed by hand;
- Woody patch cavities will be in-filled with suitable growth medium; and
- Growth properties will be improved by the addition of organic matter and fertilizer.

13.3.3 Alien Invasive Species Management

In order to manage alien invasive species, the following will be done:

- Mechanical methods including tree felling, hand pulling & ring barking will be implemented;
- Chemical control methods including selective/ non-selective, contact/ systemic herbicides as per regulations will be implemented;
- Category 1(a), & 1(b) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) listed species will be target for eradication;
- Preventative measures will be undertaken within the mine site area where natural vegetation occurs to combat bush encroachment and invasion of alien species which may result in the deterioration of natural resources; and
- Regular monitoring of site will take place.

14 Monitoring and Maintenance

The purpose of monitoring is to ensure that the objectives of rehabilitation are met and that the rehabilitation process is followed. The physical aspects of rehabilitation should be carefully monitored during the operational phase as well as during the progress of establishment of desired final ecosystems. The following items should be monitored continuously:

- Alignment of actual final topography to agreed planned landform;
- Depth of topsoil stripped and placed;

- Chemical, physical and biological status of replaced soil;
- Erosion status;
- Vegetation basal cover;
- Vegetation species diversity; and
- Proportion of land that has been fully rehabilitated.

14.1 Final Topography

The topography that is achieved during rehabilitation should be monitored and compared to the planned topography. The final profile achieved should be acceptable in terms of the surface water drainage requirements and the end land use objectives.

14.2 Soil

A final post-mining rehabilitation performance assessment must be completed with information that is adequate for closure applications. This involves:

- Assessment of rehabilitated soil thickness and soil characteristics by means of auger observations using a detailed grid;
- A post-mining land capability map based on soil thickness and characteristics;
- A proposed post-mining land use map;
- Erosion occurrences;
- Soil acidity and salt pollution analyses (pH, electrical conductivity and sulphate) at 0-250 mm soil depth every 4 ha (200 m x 200 m); and
- Fertility analysis (exchangeable cations K, Ca, Mg and Na and phosphorus).

14.2.1 Erosion

Erosion monitoring of rehabilitated areas should be undertaken and zones with active erosion should be identified.

14.3 Vegetation

The section below provides the additional information with respect to monitoring an maintenance of vegetation that is established in addition certain success criteria and what components associated with vegetation should be monitored.

14.3.1 Basal Cover

Basal cover refers to the proportion of ground at root level which is covered by vegetation and by the rooting portion of the cover plants. The line-transect method can be used to establish sampling positions. Basal cover should match that of reference sites in the surrounding

grassland. It is important to note the difference between basal cover and canopy cover, shown in Figure 14-1.

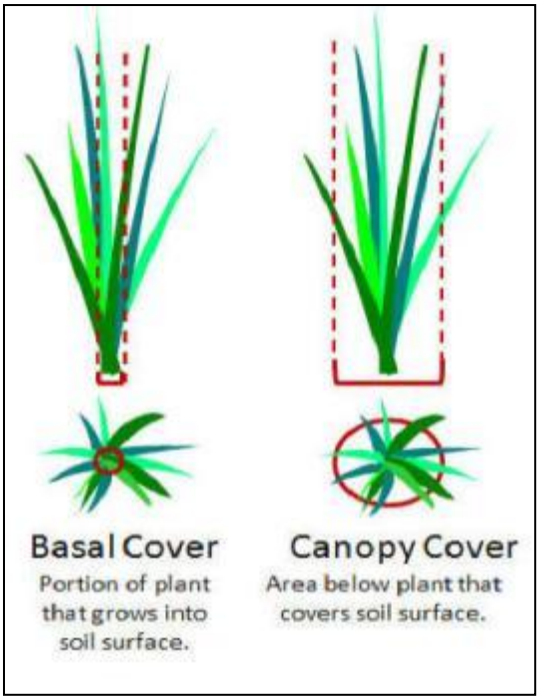

Figure 14-1: Diagram Comparing Basal Cover and Canopy Cover[3]

14.3.2 Vegetation Species

Biodiversity assessments and surveys should be undertaken by qualified external botanical experts to establish the full range of plants that have become established. Summer and winter samplings should be done during these assessments.

14.4 Alien Invasive Plant Control Plan

Alien invasive species tend to out-compete the indigenous vegetation; this is due to the fact that they are vigorous growers that are adaptable and able to invade a wide range of ecological niches (Bromilow, 1995). They are tough, can withstand unfavourable conditions and are easily spread.

14.4.1 Alien Species Control

Alien invasive plant species are difficult to control. Methods should be used that are appropriate for the species concerned, as well as to the ecosystem in which they occur. When performing the controlling methodology for weeds and invaders, damage to the environment must be limited to a minimum. The methodology must be performed for at least three growing

[3] (Image from Principles of Vegetation Measurement and Assessment and Ecological Monitoring & Analysis http://www.webpages.uidaho.edu/veg_measure/index.htm)

seasons to ensure the seed bank is depleted. Continual monitoring will be needed for seeds that are likely to be blown in from adjacent areas.

14.4.2 Integrated Control Strategies

The satisfactory control of weeds and other invasive species is usually only achieved when several complementary methods, including biological control, improved land management practices, herbicides and mechanical methods, are carefully integrated. Such a strategy is termed an Integrated Control Strategy (ICS).

Follow-up control of alien plant seedlings, saplings and coppice regrowth is essential to maintain the progress made with initial control work, and to prevent suppression of planted or colonizing grasses. Before starting new control operations on new infestations, all required follow-up control and rehabilitation work must be completed in areas that are originally prioritized for clearing and rehabilitation.

14.4.3 Additional Measures

The following additional measures are recommended to prevent the future introduction or spread of alien species, and to ensure the rehabilitation of transformed areas:

- There must be no planting of alien invasive plants (e.g. Black Wattle and Pampas Grass) anywhere within the project area;
- Surveys aimed at updating the alien plant list and establishing and updating the invasive status of each of the alien species, should be carried out (this can be undertaken by Copper Sunset staff);
- The transportation of soils or other substrates that contain alien plant species seed should be carefully controlled; and
- It is considered essential that appropriate veld management (particularly appropriate grazing levels and burning frequencies) should be applied to areas of secondary indigenous vegetation (e.g. secondary grassland of historically cultivated areas). Appropriate grazing levels and burning frequencies will not only ensure that good vegetation condition and biodiversity levels are maintained but will also serve to control the spread and increase in cover of palatable alien species such as *Paspalum dilatatum*.

Table 14-1: Post Closure Monitoring Programme

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	Frequency / duration		
Soil Management				
Soil fertility	▪ Undertake a visual assessment and delineate areas where poor vegetation growth has occurred; ▪ Submit soil samples to an accredit soil laboratory to conduct soil fertility analysis.	Yearly until soil fertility supports the final land use or for at least 2 years post closure.	▪ Soil analysis results comply with remediation targets at a 95-percentile level; and ▪ Self-sustaining vegetation establishment.	▪ Apply amelioration where required as informed by sampling undertaken.
Erosion	▪ Conduct a visual assessment to determine areas of potential erosion; and ▪ Undertake field investigations, fixed point photography to document the significance of the erosion occurring on site	Twice yearly for at least 2 years post closure.	▪ No evidence of significant erosion; and ▪ Good vegetation cover and species composition.	As required: ▪ Re-shape areas to ensure that they are free draining; ▪ Establish vegetation on bare patches; and ▪ Repair and stabilisation of erosion gullies and sheet erosion.
Post-mining end land use	▪ Assess activities completed, as well as legal and related documentation completed and signed-off; and ▪ Ensure rehabilitation measures are aligned to the LUP.	Once off, at mine closure.	▪ Area has been rehabilitated to an aesthetic quality not to compromise potential tourism; ▪ Transfer to third party operator has taken place once the area has been proven to be safe for redevelopment; ▪ Legal and zoning issues have been addressed; and ▪ Vegetation re-establishment, cover and composition are sustainable.	▪ Refer back to end land use approach and refine measures to be implemented in achieving the desired final land use.
General site status	▪ Conduct a visual assessment with respect to compliance of the afore-mentioned closure measures and to ensure that the site is aesthetically neat and tidy, and that no health or safety risks exist on site.	Once-off following implementation of rehabilitation measures.	▪ Waste/rubble free sites.	As required: ▪ Clear remnant rubble and dispose of at a registered landfill site.
Terrestrial- and Aquatic Ecosystem Health Management				
Vegetation establishment	▪ Determine whether re-established vegetation communities are on a trajectory of achieving a stable self-sustaining community dominated by species typical of the climax-species present in the adjacent areas: ▪ Inspect rehabilitated areas to assess vegetation establishment and provide for early detection of erosion in recently planted/seeded areas (monthly);	Yearly for at least 2 years post closure.	▪ Limited to no erosion; and ▪ Self-sustaining vegetation ecosystem.	As required: ▪ Re-vegetate poorly established rehabilitated areas; ▪ Re-seed bare patches; and ▪ Apply additional fertiliser and/or organic matter, depending on the condition of the vegetation and the initial organic material application.

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	Frequency / duration		
	▪ Undertake fixed point photography at specific points at the rehabilitated sites to obtain a long term directly comparable method of determining changes in the landscape; and ▪ Conduct evaluation of rehabilitated areas by means of field inspections. During these assessments' measurement of growth performance and species abundance will be carried out to determine: i. Plant basal cover and species abundance in the grassed areas. Estimates of vegetation canopy and ground cover as well as height; ii. Distribution, growth and survival of woody species; iii. Dominant plant species (woody and herbaceous); iv. Presence of exotic invasive species, and degree of encroachment; v. Browsing or grazing intensity; vi. Notes regarding erosion, such as, type, severity, degree of sediment build-up; and vii. Species composition and richness.			
Invasive alien species	▪ Visually inspect areas where invasive species have been previously eradicated and areas prone to invasive species (e.g. eroded/degraded areas, along drainage lines, etc.); and ▪ Undertake surveys on relevant sites where bush encroachment has previously been identified to determine the status quo of invasive vegetation.	Yearly for at least 2 years post closure.	▪ Limit and/or prevent declared Category 1, 2 and 3 invader species establishing; ▪ Minimise extended threat to ecosystems, habitats or other species; ▪ Increase the potential for natural systems to deliver goods and services; and ▪ Minimise economic or environmental harm or harm to human health.	▪ Revisit mitigation measures; and ▪ Continue control and management.

15 Preliminary Mine Closure Schedule

The mine closure schedule addresses the timing of rehabilitation and closure activities performed during the decommissioning and post-closure phases of Copper Sunset Operation. The schedule presented is high level and identifies the key activities Copper Sunset Operation will conduct during the decommissioning and post closure phases.

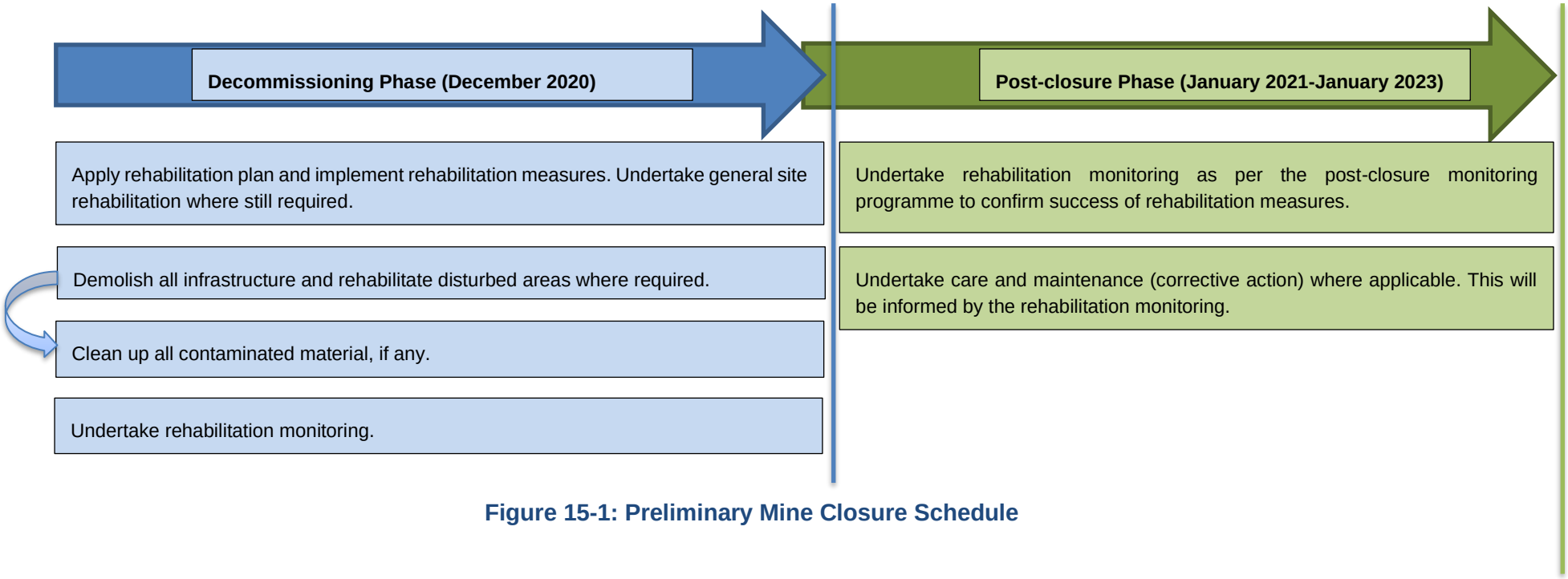

Figure 15-1: Preliminary Mine Closure Schedule

16 Proposed Concurrent Rehabilitation

The financial provision has been compiled in consideration that Serti may not mine the area and is based on information provided from the Mine Works Programme. This has been done to ensure that provision is available in the event that Seriti do not mine the area once Copper Sunset has completed with sand mining activities.

Concurrent rehabilitation should be undertaken on the mined-out strips. The current rehabilitation process will involve the removal and stockpiling of topsoil, mining of sand, then placement of topsoil and levelling and shaping. Typically, the topsoil is not stockpiled for longer than five days. Subsequent to mining, the mined-out strips are then contoured, and the stockpiled topsoil is applied and levelled to resemble the pre-mining landscape. Although this contouring and levelling occurs, there is an overall lowering of the topography; however, rehabilitation is aiming to ensure the site is free draining. Shortly after mining, the land is reshaped to mimic the natural landscape. The area is then fertilized using 2:3:2 at 250 kg per hectare. Thereafter, areas are reseeded by hand sowing.

17 Financial Provision

The focus of this financial provision calculation is to estimate the cost of final closure and rehabilitation, including general surface rehabilitation of the disturbed areas in the event that Seriti does not mine the area to ensure that there are enough funds available for rehabilitation purposes.

The combination of concurrent rehabilitation and various other management measures will significantly reduce Copper Sunset's environmental liabilities at closure. All areas included in the assessment were assumed to be the only areas Copper Sunset is liable for and no investigation was conducted to determine whether they are responsible for any additional areas.

17.1 Methodology

Section 41 (1) of the MPRDA has been repealed and Section 24P of the NEMA, as amended, which provides that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts.

This section details the cost estimate as calculated using the DMR method of calculation. As per the Department of Mineral Resources (DMR) Guideline Document, Digby Wells assumed that the mine infrastructure has no salvage value. This is necessary as it is often difficult to determine the salvage value of the infrastructure.

17.1.1 Infrastructure Measurement

A site visit was conducted by Digby Wells' personnel on 8th January 2020. The measurements for each mining area were based on the site assessment. The mine's surveyor provided the

latest survey drawing used by Digby Wells for measurements of infrastructure and areas to be mined.

17.1.2 Cost Calculation

The DMR Guideline makes use of a set template for which defined rates and multiplication factors are used. The multiplication and weighting factors which ultimately define the rate to be used are determined by amongst others the topography, the classification of the mine according to mineral mined, the risk class of the mine and its proximity to built-up or urban areas.

Quantities for certain defined items e.g. plant and related infrastructure, are then inserted and the cost for closure is calculated. Contingencies and VAT are applied to the cost.

17.1.3 Rates

The DMR Master Rates were published by the DMR in 2005 however, due to inflation, these are no longer accurate. The 2005 Master Rates were escalated yearly by the average annual inflation rate to reflect rates more representative of the year 2020.

17.1.4 DMR Classification

The DMR Guideline Document classifies a mine according to a number of factors which allows one to determine the appropriate weighting factors to be used during the quantum calculation. The following factors are considered:

- The mineral mined;
- The risk class of the mine;
- Environmental sensitivity of the mining area;
- Type of mining operation; and
- Geographic location.

The classification of the mine as per the DMR Guideline document is given in Table 17-1.

Table 17-1: Mine Classification

Mine	Risk Class	Sensitivity	Terrain	Proximity to Urban Area
Copper Sunset	C	Medium	Flat	Urban

17.2 Financial Provision

The focus of this financial provision calculation is to estimate the cost of backfilling the area impacted upon by sand mining activities and the general surface rehabilitation of the disturbed areas. The costing provided for is for the rehabilitation of the total area that will be disturbed

to ensure that enough provision is available in the event that New Vaal does not mine the area.

The financial provision estimate based on the DMR calculation model is R 1,338,857.00. This includes P&Gs (12%) and a Contingency cost (10%) as per the DMR Guideline document. The DMR cost includes VAT at 15%.

The detailed breakdown of the costs is provided below.

The assumptions that the costing is based on are provided below:

- The rehabilitation of the mined strips has been included under general surface rehabilitation as the mining is not considered open pit mining as defined by the guideline;
- Five (5) hectares has been included under general surface rehabilitation for areas impacted upon by sand mining activities;
- Rehabilitation of access roads has been included and the width of the access road has been assumed to be five (5) meters wide;
- Costs for water management have been included to allow for general shaping of mined areas; and
- Monitoring for a period of two-three years has been included.

Table 17-2: Summary of Financial Provision

Class C (Medium Risk)		Unit:	A	B	C	D	E=A*B*C*D
			Quantity	Master rate	Multiplication factor	Weighting factor 1	Amount (Rands)
Component	Description:		Step 4.5	Step 4.3	Step 4.3	Step 4.4	
1	Dismantling of processing plant & related structures (incl. overland conveyors & Power lines)	m^3		R 15.82	1.00	1.00	R 0
2 (A)	Demolition of steel buildings & Structures	m^2		R 220.31	1.00	1.00	R 0
2 (B)	Demolition of reinforced concrete buildings & structures	m^2		R 324.66	1.00	1.00	R 0
3	Rehabilitation of access roads	m^2	5,000.00	R 39.42	1.00	1.00	R 197,118
4(A)	Demolition & rehabilitation of electrified railway lines	m		R 382.64	1.00	1.00	R 0
4(B)	Demolition & rehabilitation of non-electrified railway lines	m		R 208.71	1.00	1.00	R 0
5	Demolition of housing &/or administration facilities	m^2		R 440.62	1.00	1.00	R 0
6	Opencast rehabilitation including final voids & ramps	ha		R 224,250.39	**0.52**	1.00	R 0
7	Sealing of shafts, adits & inclines	m^3		R 118.27	1.00	1.00	R 0
8(A)	Rehabilitation of overburden & spoils	ha		R 153,983.72	1.00	1.00	R 0
8(B)	Rehabilitation of processing waste deposits & evaporation ponds (basic, salt producing waste)	ha		R 191,783.95	1.00	1.00	R 0
8(C)	Rehabilitation of processing waste deposits & evaporation ponds (acidic, metal-rich waste)	ha		R 557,031.48	**0.66**	1.00	R 0
9	Rehabilitation of subsided areas	ha		R 128,938.18	1.00	1.00	0
10	General surface rehabilitation	ha	5.00	R 121,981.08	1.00	1.00	R 609,905
11	River diversions	ha		R 121,981.08	1.00	1.00	R 0
12	Fencing	m		R 139.14	1.00	1.00	R 0
13	Water management	ha	5.00	R 46,380.64	**0.25**	1.00	R 57,976
14	2 to 3 years of maintenance & aftercare	ha	5.50	R 16,233.22	1.00	1.00	R 89,283
15(A)	Specialist studies						
							R 954,282
Weighting Factor 2 (step 4.4)			**1.00**			**Sub Total 1**	**R 954,282**
					Preliminary and General	12% of Sub Total 1	R114,513.80
					Contingency	10% of Sub Total 1	R95,428.17
						Sub Total 2	**R 1,164,224**
						VAT (15%)	**R 174,634**
						GRAND TOTAL	**R 1,338,857**

18 Conclusion and Recommendations

To work towards achieving an environmentally safe and sustainably closed project area, concurrent rehabilitation is the key (dependant on whether or not New Vaal mine the area once Copper Sunset is complete with their sand mining operations).

The proposed impacts as a result of the sand mining activities, with mitigation being adopted, is considered low.

Monitoring and maintenance for the areas impacted upon should be undertaken for two to three years after closure.

The key to the success of the project is defined by the implementation of the proposed mitigation measures, with a key focus on the following:

- Remove and control of alien invasive species;
- Management of topsoil resources; and
- Communication and integration of workflows between Seriti and Copper Sunset.

19 Closing Statement

The aim of this RCP is to provide both Copper Sunset and the DMR with a comprehensive plan for the closure and post closure phases at the mine. It must be noted that the recommendations provided within this report are based on the assumptions that Copper Sunset will be responsible for the rehabilitation of the area once sand mining activities have been undertaken, assuming that Seriti does not mine the area. If Seriti do mine the area as planned, then recommendations contained within the New Vaal Closure and Rehabilitation Plan will take precedent over what has been recommended within this report.

Copper Sunset is committed to providing regular updates to the DMR on progress with respect sand mining activities undertaken within New Vaal.

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