

**ZANDBERG SANDPUT (PTY) LTD
PORTION 4 OF THE FARM ZANDBERG FONTEIN 97
ROBERTSON MUNICIPAL DISTRICT
WESTERN CAPE PROVINCE**

CLOSURE PLAN



**DEPARTMENTAL REFERENCE NUMBER:
WC 30/5/1/2/2/87 MR & WC 30/5/1/2/2/10080 MR**

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EXECUTIVE SUMMARY

Greenmined Environmental (Pty) Ltd is the consultants responsible for the S102 amendment application and associated amendment of the EMPR, and in light of this, the Annual- and Final Rehabilitation, Decommissioning and Mine Closure Plan (*in aliis verbis* Closure Plan) of the Zandberg Sand Mine was accordingly drafted to align it with the proposed changes should the S102 Application be approved.

The purpose of this document is to provide site management with an Annual Rehabilitation Plan as well as the Final Rehabilitation, Decommissioning and Closure Plan, compiled in terms of the NEMA Amendment Act, 2014 (Act No. 25 of 2014) read with the Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, November 2017 (GN 1228, Financial Provision Regulations 2017). The amendment of the closure plan entails a review of the following aspects:

1. Annual rehabilitation as reflected in the annual rehabilitation plan;
2. Final rehabilitation, decommissioning and closure of the mining operations at the end of the life of operations as reflected in the final rehabilitation, decommissioning and mine closure plan;
3. Remediation of latent or residual environmental impacts, which may become known in the future, as, reflected in the environmental risk assessment report.

Annual Rehabilitation Plan:

Sand mining commenced in the 1980's on Portion 4 of the farm Zandberg fontein No 97, Robertson. Mining commenced in the south-eastern corner of the mining area. Presently, the mining direction is towards the northern- and western boundaries of the approved footprint. The operational phase of the mine involves the removal of the topsoil of a strip of ± 0.25 ha within which the sand is mined in a block of approximately 50 x 50 m. The topsoil is stockpiled at the edge of the strip to be replaced during the rehabilitation of the area. The sand is then removed from the stripped area with a front-end-loader (FEL) that loads it directly onto the trucks of clients. Upon reaching the sandstone layer the mined-out strip is rehabilitated as work continues into the consecutive phase/strip. No more than two strips (± 0.5 ha) are open at any given time.

The Right Holder intends to mine ± 0.5 ha sand per year depending on market demand and sales. In light of this, it is proposed that at least 0.25 ha of the proposed 0.5 ha will be rehabilitated in a 12-month period.

Rehabilitation, Decommissioning and Mine Closure Plan:

Rehabilitation will include activities to be divided into medium- and long term categories. In the medium term, rehabilitation will entail the continuous reinstatement and seeding of mined-out strips, and the management of weeds and invasive plant species. In the long term, rehabilitation will involve final landscaping of the site, the replacement of the topsoil on the final strip and the removal of the FEL prior to the submission of a closure application to the Department of Mineral Resources and Energy (DMRE). The MR holder will further be responsible for the seeding of all rehabilitated areas.

Environmental Risk Assessment Report:

At this stage, no latent risks that will potentially arise during closure phase of the mining area were identified. By reason of the fact that no latent risks with regard to the management of the mining area were identified no additional monitoring, auditing or reporting requirements are required at this stage.

LIST OF DEFINITIONS

Abandonment: The act of abandoning and relinquishment of a mining claim or intention to mine, a voluntary surrender of the claim or mine to the next party.

Appropriately qualified: A person who has training in the skills appropriate to the type of work to be done, and experience of the type of mine and of the size, complexity and safety classification of the deposit or the environmental conditions (or both) pertaining to the specific project.

Closure Plan: Annual Rehabilitation and Final Rehabilitation, Decommission and Closure Plan.

Biodiversity: Biodiversity is an abbreviation of "biological diversity". It means the variety of living things – the different plants, animals and microorganisms, the genes they contain and the ecosystems of which they are a part.

Closure: The act of reinstating a redundant mine which is acceptable for final mine closure.

Context of an environmental impact: The overall environmental setting in which an environmental impact occurs. It includes all "natural" components and characteristics (or both) and all "human and social" components and characteristics (or both). It has both spatial and time dimensions.

Design: The documented result of a systematic process during which all relevant factors and criteria are taken into account. The design includes the design report, the working drawings and the operations manual.

Environmental impact: Any change in the state of a component of the environment, whether adverse or beneficial, that wholly or partially results from activities, projects or developments.

Environmental integrity: The reliability of performance of the environmental impact management measures associated with the facility, with respect to the environmental performance objectives.

Environmental management programme: A programme contemplated in the Mineral and Petroleum Resources Development Act, submitted to and approved by the Director: Mineral Development, and detailing the plan to be adopted and implemented by a mine for managing the environmental effects of the operations of the mine.

Environmental objectives: Those objectives that represent the desired state of environmental components that have been adopted for the mine.

Intensity of an environmental impact: The severity of the consequences of an environmental impact, as judged by suitably qualified persons.

Manager of a mine (general manager): Any competent person appointed in terms of the Mine Health and Safety Act, 1996 (Act 29 of 1996), to be responsible for the control, management and direction of a mine.

Rehabilitated land: Is defined as land that has previously been mined through or areas, which have been disturbed by the mining process. These areas have been levelled, covered with topsoil, fertilized, seeded and are capable of supporting a sustained long-term vegetation cover.

Redundant: No longer required for mining operation.

Reliability: The probability that a specified event will not occur in a specified time (usually expressed as a ratio, when measured in quantitative terms).

Risk: The probability that a specified event, such as failure, will occur in a specified time.

Scheduled closure: Planned closure of the mine

Significant environmental impact: An impact in respect of which consultation (with the relevant authorities and other interested and affected parties) on the context and intensity of its effects provides reasonable grounds for mitigating measures to be included in the environmental management programme. Significance is determined by the integration of the context and intensity of the effects of the impact, and the likelihood that the impact will occur.

Topsoil: means the layer of soil covering the earth which –

- (a) provides a suitable environment for the germination of seed;
- (b) allows for penetration of water; and
- (c) Is a source of microorganisms, plant nutrients and in some cases seed.

Unscheduled closure: The closure cost associated with immediate closure and provision.

LIST OF ABBREVIATIONS

DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Performance Assessment
EMPR	Environmental Management Program
I&AP's	Interested and Affected Parties
MPRDA	Mineral and Petroleum Resources Act, 2002 (Act No 28 of 2002)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
SLP	Social and Labour Plan
WCMR	Waste Classification and Management Regulations
WWF	World Wildlife Fund

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1. INTRODUCTION

Sand mining commenced in the 1980's on Portion 4 of the farm Zandberg fontein No 97, Robertson. The Zandberg Sand Mine operated under an old order mining permit (Reference No: MP 39/98) that was converted to a new order mining right (Protocol No: 1435) in terms of Item 7 of Schedule 2 of the MPRDA, 2002 in March 2011. This mining right (7.4826 ha) was valid until February 2016, upon which the DMRE renewed it until May 2047. In 2014, the MR Holder applied for a 10.2026 ha extension of the approved 7.4826 ha mining area that was granted in December 2018. In November 2018, the mining right was ceded from WJ Viljoen to Zandberg Sandput (Pty) Ltd that is the current MR holder.

In 2020, Zandberg Sandput (Pty) Ltd submitted a Section 102 ("S102") amendment application to add 108.3851 ha to the current 17.6826 ha mining footprint. The S102 application necessitates an application for a Part 2 amendment of the mine's EMPR in terms of GNR 326 Section 31. The S102 application further constitute listed/specified activities in terms of the NEMA: EIA Regulations, 2014 (as amended) and therefore requires an environmental impact assessment (EIA). Greenmined Environmental (Pty) Ltd ("Greenmined") is the consultants responsible for the S102 amendment application ("S102") and associated amendment of the EMPR, and in light of this, the Annual- and Final Rehabilitation, Decommissioning and Mine Closure Plan (*in aliis verbis* Closure Plan) of the Zandberg Sand Mine was accordingly drafted to align it with the proposed changes should the S102 Application be approved.

This report (the Closure Plan) stipulates the rehabilitation methods to be followed in the restoration of the Zandberg mining footprint. The report was compiled in line with Government Notice 940 of the National Environmental Management Act, 1998 [NEMA] (Act No. 107 of 1998) together with Regulation 62 of the Minerals and Petroleum Resources Development Act, 2002 [MPRDA] (Act No. 28 of 2002). The information used in this report was sourced from the Zandberg site management, as well as site inspections and background information gathered from the mine's EMPR (2014).

The purpose of this document is to provide site management with an Annual Rehabilitation Plan as well as the Final Rehabilitation, Decommissioning and Closure Plan, compiled in terms of the NEMA Amendment Act, 2014 (Act No. 25 of 2014) read with the Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, November 2017 (GN 1228, Financial Provision Regulations 2017).

1.1 PROJECT STATUS

As mentioned earlier, sand mining commenced in the 1980's on the above mentioned property. Mining commenced in the south-eastern corner of the mining area. Presently, the mining direction is towards the northern- and western boundaries of the approved footprint. The operational phase of the mine involves the removal of the topsoil of a strip of ± 0.25 ha within which the sand is mined in a block of approximately 50 x 50 m. The topsoil is stockpiled at the edge of the strip to be replaced during the rehabilitation of the area. The sand is then removed from the stripped area with a front-end-loader (FEL) that loads it directly onto the trucks of clients. To date every mined-out strip (± 0.25 ha) was rehabilitated before work continued at the consecutive phase/strip. However lately the height of the dune increased considerably and safety requirements now dictate that the MR Holder reduce the height of the mining face. This is achieved by pushing the sand (after removal of the topsoil) down the mining face onto a section of the adjacent/most recently mined-out strip. The excavator then loads the sand from the floor of the mine onto the trucks of the clients. In light of this, the mining method now requires a maximum of two strips (± 0.5 ha) to be open at any given time. As the face of the dune recedes, the mined out areas (no longer needed for the loading of sand) is rehabilitated.

The EMPR of the MR Holder mentions that at no time may there be more than 1 ha of land opened and/or in use. Approximately 8 ha (as estimated April 2020) of the approved 17.6826 ha area remains available for mining.

No permanent infrastructure has been established within the mining area, and no electricity connection is needed to allow for the operation of the mine. A chemical toilet, was placed on site, that is used by the FEL operator. The FEL is removed to the off-site workshop on the farm or the town of Robertson when maintenance and/or servicing is needed. Likewise, the mining site does not require the storage of diesel, and fueling of the FEL is done at the farm yard (off-site) or by means of a mobile diesel bowser with the use of a drip tray.

The Applicant makes use of an existing gravel road that connects with the La Chasseur/Agter-Kliphogte road (DR1342) to access the sand mine.

The material mined from the footprint is sold as building- and filling sand to the local building industry which include the towns of Robertson, Ashton and McGregor.

1.1.1 S102 Amendment Proposal

The MR Holder submitted an application for consent of the minister to extend the existing mining right footprint of the Zandberg Sand Mine with 108.3851 ha, in terms of Section 102 of the MPRDA, 2002. Should the S102 application be approved, mining will advance into the extension area (refer to the EIAR) as the current mining footprint (± 17.7 ha) is mined-out. The mining method will remain the same as the method currently implemented by the MR holder, and no infrastructure will be established in the extension area. As mentioned earlier, should the project be authorised the mining area will only contain one front-end-loader.

1.2 OBJECTIVE OF THE CLOSURE PLAN

The purpose of the Closure Plan is to describe the rehabilitation processes that need to take place to ensure that the mine reaches its full environmental potential upon closure.

The primary objective, at the end of the mine's life, is to obtain a closure certificate at minimum cost and in as short a period as possible whilst still complying with the requirements of the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) [MPRDA]. To realise this, the following main objectives must be achieved:

- ❖ Remove all temporary infrastructure and waste from the site as per the requirements of the EMPR and of the Provincial Department Mineral Resources and Energy.
- ❖ Shape and contour all disturbed areas in compliance with the EMPR.
- ❖ Ensure that permanent changes in topography (due to mining) are sustainable and do not cause erosion or the damming of surface water.
- ❖ Use the topsoil effectively to promote the re-establishment of vegetation.
- ❖ Ensure that all rehabilitated areas are stable and self-sustaining in terms of vegetation cover.
- ❖ Eradicate all weeds/invaser plant species by intensive management of the mine site.

2. DETAILS OF THE AUTHOR

Zandberg Sandput (Pty) Ltd appointed Greenmined to compile the Closure Plan of the mine. Ms Christine Fouché is the responsible consultant for the project and holds a Diploma in Nature Conservation and a B.Sc. in Botany and Zoology with fifteen years' experience in doing environmental impact assessments and compliance monitoring in South Africa (see CV and proof of experience attached as Appendix R to the EIAR & EMPR).

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Declaration of Independence:

I, Christine Fouche, in my capacity as environmental control officer declare that–

- ❖ I act as independent environmental control officer in this compliance audit;
- ❖ I will perform the work relating to the audit in an objective manner, even if the results and findings are not favourable to the holder of the authorisation;
- ❖ I have expertise in conducting environmental compliance audits, including knowledge of the Act and regulations that have relevance to the activity;
- ❖ I will adhere to and comply with all responsibilities as indicated in the National Environmental Management Act and Environmental Impact Assessment Regulations.
- ❖ I do not have and will not have any vested interest in the activity other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014.



Christine Fouché

Date: 21 September 2020

3. LEGAL BACKGROUND AND BEST PRACTICES

This section provides an overview of the legislative requirements applicable to the project, including the acts, guidelines and policies considered in the compilation of the Closure Plan.

3.1 THE CONSTITUTION OF SOUTH AFRICA, 1996 (ACT NO. 108 OF 1996)

The legislative motivation for this project is underpinned by The Constitution of South Africa, 1996 (Act No. 108 of 1996), which states that:

The State must, in compliance with Section 7(2) of the Constitution, respect, protect, promote and fulfil the rights enshrined in the Bill of Rights, which is the cornerstone of democracy in South Africa. Section 24 of the Constitution:

24. Environment

-Everyone has the right-

- (a) To an environment that is not harmful to their health or well-being; and*
- (b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-*
 - (i) Prevent pollution and ecological degradation;*
 - (ii) Promote conservation; and*
 - (iii) Secure ecologically sustainable development and use of natural resources while promoting a justifiable economic and social development.*

Section 24 of the Constitution of South Africa requires that all activities that may significantly affect the environment and require authorisation by law must be assessed prior to approval. In addition, it provides for the Minister of Environmental Affairs or the relevant provincial Ministers to identify:

- ❖ New activities that require approval;
- ❖ Areas within which activities require approval; and
- ❖ Existing activities that should be assessed and reported on.

Section 28(1) of the Constitution of South Africa states that:

“Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring”.

If such pollution or degradation cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution or degradation. These measures may include:

- ❖ Assessing the impact on the environment.
- ❖ Informing and educating employees about the environmental risks of their work and ways of minimising these risks;
- ❖ Ceasing, modifying or controlling actions which cause pollution/degradation;
- ❖ Containing pollutants or preventing movement of pollutants;
- ❖ Eliminating the source of pollution or degradation; and
- ❖ Remedying the effects of the pollution or degradation.

3.2 THE MINERALS AND PETROLEUM RESOURCES ACT, 2002 (ACT NO. 28 OF 2002) [MPRDA]

The table below summarises the relevant sections in terms of the MPRDA, 2002.

Table 1: Summary of the relevant rehabilitation sections of the MPRDA, 2002

AREA OF CONCERN	SECTION	LEGAL REQUIREMENTS
Environmental Management	Section 37	<i>Requires that the principles set out in section 2 of NEMA must apply to all prospecting and mining operations, and that the generally accepted principles of sustainable development must be applied by integrating social, economic and environmental factors during the planning and implementation phases of mining projects.</i>
	Section 38	<i>Requires the applicant to manage all environmental impacts in accordance with his or her environmental management plan (EMPR) or the approved EMPR.</i>
	Section 39	<i>Deals with the requirements of an EMP/EMPR, whichever is applicable.</i>
Financial Provision	Section 41	<i>Financial provision needs to be provided and annually assess the environmental liability.</i>
Closure Certificate	Section 43	<i>Holder of a mining right is responsible for all environmental liabilities as may be identified in the EMP, application needs to be made to the regional manager for the closure certificate.</i>
Removal of Infrastructure	Section 44	<i>When the mining operation comes to an end the mine may not remove buildings, structures or objects which may not be demolished or removed in terms of any other law.</i>

3.2.1 Regulation 527 of the MPRDA, 2002

Government Notice No. R.527, as published in the Government Gazette, 23 April 2004 (GG No. 26275, Volume 466) of MPRDA stipulate that the following closure objectives must form part of the EMPR:

- ❖ Identify the key objectives for closure of the operation to guide the project design;

- ❖ Development and management of environmental impacts;
- ❖ Provide future land use objectives for the site; and
- ❖ Provide proposed closure costs.

Table 2: Requirements of Government Notice 527

AREA OF CONCERN	REGULATION	LEGAL REQUIREMENTS
The need to prevent and alleviate pollution arising from mining activities.	Regulation 42(1)	<i>Section 42(1) of the MPRDA stipulates that the closure process must start at the commencement of a mining operation and continue throughout the entire life of the mine. Furthermore, future closure and land use objectives must be included in the EMP. Section 42(1) d stipulates that any environmental damage or residual impacts that are identified during the Environmental Risk Assessment (ERA) phase must be acceptable to all Interested and Affected Parties (I&AP's) in line with Section 24(a) of the National Constitution.</i>
Mine Closure	Regulation 43	<i>A closure plan contemplated in Section 43(3)(d) of the Act, forms part of the EMPR or EMP, as the case may be, and must include – a summary of the results of progressive rehabilitation undertaken.</i>
Part III of R 527 deals with environmental regulations for mineral development, petroleum exploration and production.	Regulation 56	<i>In accordance with applicable legislative requirements for mine closure, the holder of a prospecting right, mining right, retention permit or mining permit must ensure that –The land is rehabilitated, as far as is practicable, to its natural state, or to a predetermined and agreed standard or land use which conforms with the concepts of suitable development.</i>

3.3 THE NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998) [NWA]

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected as well as integrated management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways, which take into account:

- ❖ Meeting the basic human needs of present and future generations;
- ❖ Promoting equitable access to water;
- ❖ Redressing the results of past racial discrimination;
- ❖ Promoting the efficient, sustainable and beneficial use of water in the public interest;
- ❖ Facilitating social and economic development;
- ❖ Providing for growing demand for water use;
- ❖ Protecting aquatic and associated ecosystems and their biological diversity;

- ❖ Reducing and preventing pollution and degradation of water resources;
- ❖ Meeting international obligations; and
- ❖ Managing floods and droughts.

The following sections of the NWA, 1998 are relevant.

Table 3: NWA, 1998 applicable sections

AREA OF CONCERN	SECTION	LEGAL REQUIREMENTS
Prevention and remedying effects of pollution.	Section 19	<i>Any situation exist or which may cause or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.</i>
Control of emergency incidents.	Section 20	<i>Incidences of pollution needs to be reported the Department and the relevant catchment agency</i>
General principles: Water uses	Section 21	<i>The MR Holder has a valid General Authorisation issued by DWS in 2017.</i>

3.4 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO 107 OF 1998) [NEMA]

The National Environmental Management Act (NEMA) strives to regulate national environmental management policy and is focussed primarily on co-operative governance, public participation and sustainable development. NEMA makes provisions for co-operative environmental governance by establishing principles for decision making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith.

The following sections are relevant.

Table 4: NEMA, 1998 applicable sections

AREA OF CONCERN	SECTION	LEGAL REQUIREMENTS
Principles that may significantly affect the environment.	Section 28	<i>General duty of care on every person who causes, has caused or may cause significant pollution or degradation of the environment to take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.</i>

AREA OF CONCERN	SECTION	LEGAL REQUIREMENTS
Control of emergency incidents.	Section 30	<i>Incidences of pollution needs to be reported the Department.</i>
Environmental Management Plan.	Section 34	<p><i>A draft EMP must include –</i></p> <p><i>information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –</i></p> <p><i>(iv) rehabilitation of the environment;</i></p> <p><i>as far as reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally acceptable principle of sustainable development, including where appropriate, concurrent or progressive rehabilitation measures.</i></p>

3.4.1 Regulation 1228 of NEMA, 1998

NEMA, GNR 1228 GG 41236, known as the NEMA Financial Provision Regulations, 2015 (amended 2017), was promulgated in November 2015, and in terms of these regulations holders of a mining right are allowed a transitional period of 39 months (19 February 2019) from the date of promulgation to comply. The compliance date was extended to 19 February 2020.

As mentioned earlier the right holder must annually update the annual rehabilitation, final rehabilitation and remediation of latent environmental impacts and ensure it is compliant with the Financial Provision Regulations of 2015. The reports need to be conducted in the format that was supplied in the regulations as per Appendix 5 and Appendix 6.

3.5 THE NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT, 2008 (ACT NO 57 OF 2008) [NEM:WA]

The rehabilitation measures must be aligned with the objections of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM: WA) which includes:

- (a) To protect health, well-being and the environment by providing reasonable measures for—
 - (i) Minimising the consumption of natural resources;
 - (ii) Avoiding and minimising the generation of waste;

- (iii) Reducing, re-using, recycling and recovering waste;
 - (iv) Treating and safely disposing of waste as a last resort;
 - (v) Preventing pollution and ecological degradation;
 - (vi) Securing ecologically sustainable development while promoting justifiable economic and social development;
 - (vii) Promoting and ensuring the effective delivery of waste services;
 - (viii) Remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and
 - (ix) Achieving integrated waste management reporting and planning;
- (b) To ensure that people are aware of the impact of waste on their health, well-being and the environment;
- (c) To provide for compliance with the measures; and
- (d) Generally, to give effect to Section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being

3.5.1 Waste Classification and Management Regulations, 2013 (GNR 634)

Waste Classification and Management Regulations (WCMR) promulgated under the National Environmental Management: Waste Act, 2008 (NEM:WA) (effective 2013) provides mechanisms to:

- ❖ Facilitate the implementation of the waste hierarchy to move away from landfill;
- ❖ Reuse, recovery and treatment;
- ❖ Separate waste classification from the management of waste;
- ❖ Divert waste from landfill and into utilisation where possible; and
- ❖ Provide measures to monitor the progress

The Waste Classification and Management Regulations ultimately enables the improved and more efficient classification and management of waste; provide for safe and appropriate handling, storage, recovery, reuse, recycling, treatment and disposal of waste and will also enable accurate and relevant reporting on waste generation and management. All waste generators, excluding domestic generators, must ensure that the waste they generate is classified within 180 days of its generation.

All wastes that were classified in terms of the “Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste in terms of the Department of Water Affairs” (2nd Edition, 1998; Department of Water Affairs and Forestry) or alternative classifications that were approved prior to the WCMR taking

effect, must be re-classified and assessed within three years from the commencement of these Regulations.

Reference is made to the NEM:WA, part 8 of Chapter 4 regarding contaminated land:

All owners of land that is significantly contaminated become obliged to report that contamination is occurring. Part 8 of Chapter 4 is concerned with the remediation of contaminated land. This new legal regime for identifying contaminated land, determining its status and the risk that it poses, and regulating the remediation process is introduced. This law imposes significant legal obligation on the owners of land and on those who cause contamination, with potentially serious financial consequences. Part 8 applies where the pollution only manifest sometime after the contamination occurred and also where the action of a person (for example, the excavation of land pursuant to a development) results in a change to pre-existing contamination. Along with the notice bringing Part 8 into effect, norms and standards for the remediation of contaminated land and soil quality (list certain contaminants and specify soil screening values for human health and environmental protection). This act also has several important implications for the sale of and, sellers who know that their lands is contaminated can no longer keep silent and this is classified as an offence.

3.6 FURTHER ACTS RELEVANT TO MINE REHABILITATION

- ❖ The Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).
- ❖ The South African Mineral Resource Committee (SAMREC) Code. Of particular importance in this regard is the determination of whether Zandberg Sand Mine has made an adequate provision for environmental rehabilitation in terms of Section 41 of the MPRDA.

3.7 BEST PRACTICE AND INTERNATIONAL GUIDELINES

Mine closure is an international challenge. South Africa has produced various well-known and reputable guidelines on matters directly linked and or associated with mine closure. Such was the need for guidelines to manage mine closure provisions in a consistent manner provided for by the DMRE (2005).

These guidelines are the only official mine closure guideline as contemplated in Regulation 54(1) in the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

Of particular importance is that this guideline document governs the closure cost assessment process in South Africa and is applied by the DMRE through its respective regional managers in each province.

The Chamber of Mines (CoM) (2007) issued a guideline for the rehabilitation of mined land. This document is a result of scientific knowledge experts. It is an on the ground reference document which provides written guidelines on the best rehabilitation techniques. Of value is how the document distinguishes between the financing, the planning and the licensing components of a typical mining program.

The World Wildlife Fund (WWF) in 2012 published a discussion document named the “Financial provision for the rehabilitation and closure in South African Mining: Discussion Document on Challenges and recommended improvements”. The document focuses on the adequacy of financial provisions and pulls a very strong link between insufficient financial allocations and that of derelict and abandoned mines in South Africa. The document further emphasizes the importance of establishing a dependency between the EMPR/EMP and financial provision which is updated and adequate

Recently a released guideline from the Government of Western Australia (GWA 2011) provides insight to the importance of mine closure. The guidelines (GWA 2011) in particular state that planning for mine closure is a critical component of environmental management in the mining industry. Notably is that this industry leading practice also requires that planning for mine closure should start before mining commence and should continue throughout the life of the mine until final closure and relinquishment. This approach enables better environmental outcomes. It is also good business practice, as it should avoid the need for costly remedial earthworks late in the project lifecycle.

4. ENVIRONMENTAL AND PROJECT CONTEXT

4.1 PROJECT LOCATION

The mining right held by Zandberg Sandput (Pty) Ltd extends over 17.6826 ha of Portion 4 of the farm Zandberg fontein No 97 and allows for the mining of sand. The table below lists the GPS coordinates of the current mining footprint.

Table 5: GPS coordinates of the mining footprint of the Zandberg Sand Mine.

NUMBER	DEGREES, MINUTES, SECONDS		DECIMAL DEGREES	
	LAT (S)	LONG (E)	LAT (S)	LONG (E)
G	33°50'41.92"	19°48'54.92"	-33.844978°	19.815256°
H	33°50'49.92"	19°48'56.52"	-33.847200°	19.815700°
I	33°50'52.18"	19°48'45.17"	-33.847827°	19.812547°
J	33°50'44.16"	19°48'43.56"	-33.845601°	19.812100°
K	33°50'42.81"	19°48'50.44"	-33.845225°	19.814011°
L	33°50'37.25"	19°48'49.99"	-33.843681°	19.813886°
M	33°50'37.92"	19°48'37.05"	-33.843867°	19.810292°
N	33°50'51.13"	19°48'38.18"	-33.847536°	19.810606°



Figure 1: Satellite view showing the location of the MR area in relation to the surrounding landscape, where the dark blue polygon shows the initial mining footprint, and the light blue polygon shows the approved extension area. (Image obtained from Google Earth).

Should the S102 amendment application be approved the GPS coordinates of the mining area will be as listed below.

Table 6: GPS coordinates of the Zandberg Sand Mine should the extension application be approved.

NUMBER	DEGREES, MINUTES, SECONDS		DECIMAL DEGREES	
	LAT (S)	LONG (E)	LAT (S)	LONG (E)
G	33°50'41.92"	19°48'54.92"	-33.844978°	19.815256°
H	33°50'49.92"	19°48'56.52"	-33.847200°	19.815700°
I	33°50'52.18"	19°48'45.17"	-33.847827°	19.812547°
J	33°50'44.16"	19°48'43.56"	-33.845601°	19.812100°
K	33°50'42.81"	19°48'50.44"	-33.845225°	19.814011°
L	33°50'37.25"	19°48'49.99"	-33.843681°	19.813886°
M	33°50'37.92"	19°48'37.05"	-33.843867°	19.810292°
N	33°50'51.13"	19°48'38.18"	-33.847536°	19.810606°
P	33°50'20.73"	19°48'34.09"	-33.839014°	19.809360°
Q	33°51'00.47"	19°47'51.75"	-33.850163°	19.797751°
R	33°51'15.84"	19°48'03.10"	-33.854400°	19.800862°



Figure 2: Satellite view showing the location of the proposed S102 extension area (red polygon) in relation to the approved MR area (blue polygons), and the surrounding landscape where the white line shows the property boundary. (Image obtained from Google Earth).

4.2 PRESENT MINING OPERATIONS

As mentioned earlier, mining commenced in the south-eastern corner of the mining area. Presently, the mining direction is towards the northern- and western boundaries of the approved footprint. The EMPR of the MR Holder mentions that at no time may there be

more than 1 ha of land opened and/or in use. As shown in the figure below, the initial mining footprint (G – K / dark blue polygon) has been mined-out, and mining now extends into the approved extension area (I – N / light blue polygon). Approximately 8 ha (as estimated April 2020) of the approved 17.6826 ha area remains available for mining.

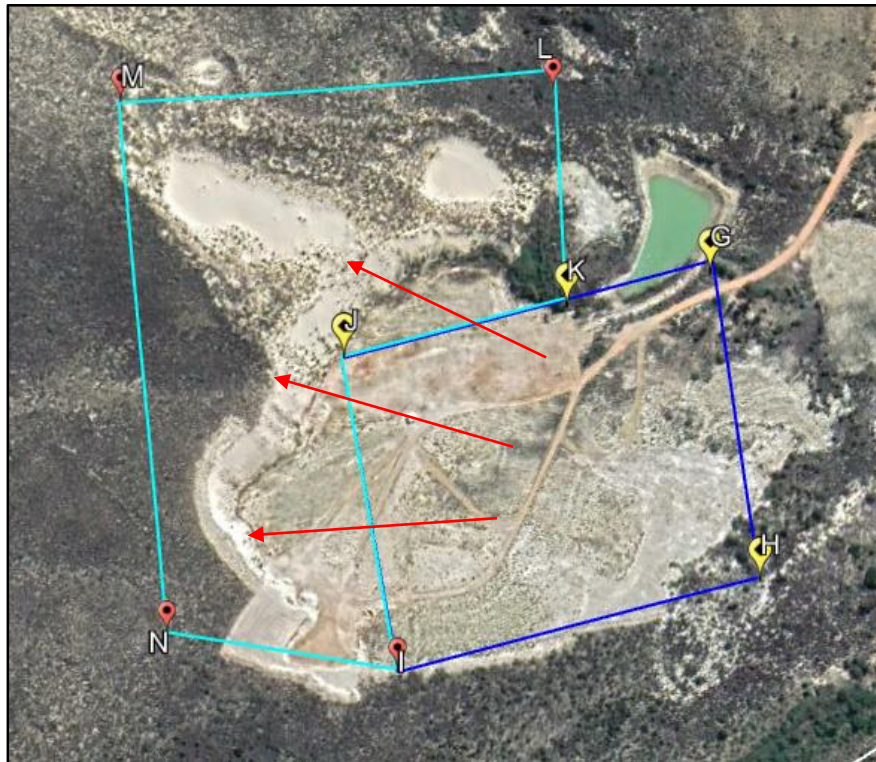


Figure 3: Satellite view showing the mined-out G – K area (dark blue polygon), as well as the area I – N (light blue polygon) that is presently being mined. The arrows indicate the mining direction. (Image obtained from Google Earth).

4.3 PROPOSED MINING OPERATION

4.3.1 Site Establishment Phase

Site establishment entails the demarcation of the extension area boundaries and identified sensitive area.

Pursuant to receipt of an Environmental Authorisation (EA) and the Section 102 Mining Right (MR) amendment, and prior to mining, the boundary of the amended mining footprint has to be demarcated. The northern boundary of the 100 m buffer, from the drainage line, will be clearly demarcated (refer to EIAR), within the boundary of the mining footprint. The southern no-go area will be signposted to restrict entry into the area by any mining related personnel.

4.3.2 Operational Phase

The operational phase of the mine involves the removal of the topsoil of a strip of ± 0.25 ha within which the sand is mined in a block of approximately 50 x 50 m. The topsoil is stockpiled at the edge of the strip to be replaced during the rehabilitation of the area. The sand is then removed from the stripped area with a FEL that loads it directly onto the trucks of clients. Upon reaching the sandstone layer the mined-out strip is rehabilitated as work continues into the consecutive phase/strip. No more than two strips (± 0.5 ha) are open at any given time.

This method will persist as mining advances into the proposed extension area. The applicant intends to mine ± 0.5 ha sand per year depending on market demand and sales.

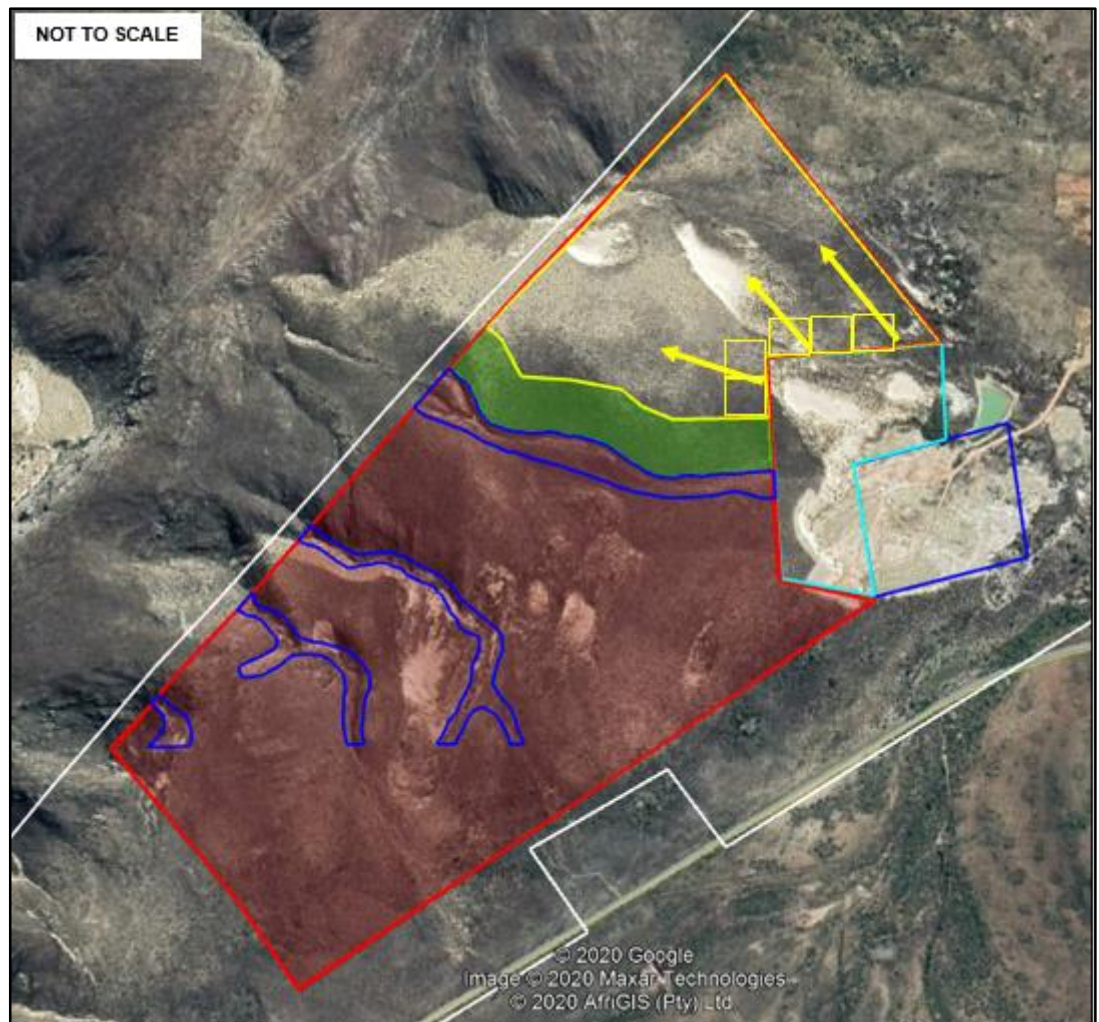


Figure 4: Schematic representation showing the proposed 0.25 ha strips (yellow blocks) in relation to the mining footprint (red polygon) where the red shaded area shows the no-go area.

4.4 TOPOGRAPHY

The natural topography of application area can be described as undulating, extending up the southern face of the Zandberg mountain on the property. The earmarked extension area has an average slope of -17.7% (437 masl along the north-western corner to 208 masl at the eastern corner). Should the preferred alternative identified in through the EIA be approved the topography of the mineable area has an average slope of -20.1% (383 masl at the north-western boundary to 211 masl at the eastern corner).

4.5 VISUAL CHARACTERISTICS

The footprint of the proposed mining area is mainly visible from the north-east to the south-west within an approximate area of 3-4 km from the mining area. Within close proximity the mining area is/will be visible from the neighbouring La Chasseur/Agter-Kliphogte road. When the viewshed analysis is drawn for the preferred alternative (named LA1 in the EIAR) the potential visual impact decreases substantially as the mining operation/effect thereof will be hidden from the south/south-western side of the farm and surrounding environment.

The small scale of the proposed operation (± 0.5 ha affected at a time), proposed progressive rehabilitation, as well as the fact that no infrastructure will be established further assist in mitigating the visual impact of the proposed development on the surrounding environment. Very little (if any) residual visual impact is expected upon closure of the mine.

4.6 GEOLOGY

A dune-like layer of sand, several meters thick, is found against the southern slope of the Zandberg. The sand layer is exposed in certain areas (blow-outs), but mainly covered by natural vegetation along the extend of the mountainside. A layer of pedocrete separates the bedrock from the sand. All of these layers are porous and water moves readily through the sand, while the downward movement is somewhat slowed by the pedocrete.

Based on the topography of the Zandberg and the prevalence of south-easterly winds in the area, the dune in the mine extension area is probably a climbing dune, and those on the opposite side of the mountain are falling dunes that have developed from sand migrating over the ridge. Climbing dunes tend to be largely homogenous in their composition, and this is the case with the Zandberg dune. With minor exceptions the sands of the Zandberg dune are apedal, containing virtually no discernible structure, another characteristic of a climbing dune rather than a sand ramp (Tyson 1999).

4.7 HYDROLOGY

The study area is located within the Upper Breede Sub-Water Management Area which is managed as part of the Breede Water Management Area by the Department of Water and Sanitation (DWS). Portion 4 of Zandberg fontein 97 falls within the H40J quaternary catchment. There are no dams, rivers or wetlands in the proposed extension footprint, however it extends over an area classified as a Phase 2 FEPA (Freshwater Priority Area) according to the National Wetlands and NFEPA map of SANBI.

The EMPR of the mine notes that water is in evidence as a leachate at the tow of the dune. This is due to a perched water table caught in the sand overlaying the sandstone formation of the area. The seepage naturally occurs all along the foot of the dune with a clearly defined water course (drainage line) in evidence (opposite the road). According to the EMPR, the sand dune is classified as an unconfined phreatic aquifer located above the regionally extensive aquifer. A feature of phreatic aquifers is that they release large quantities of water by drainage through the pores of the aquifer. In this case the border of the sand dune. Because there is no aquitard confining the water, this drainage typical continues up to the drainable porosity of the aquifer material. The visible effect of drainage is more pronounced in the winter rainy season. No evidence was found that there is a cone of depression in the groundwater formed by the mining activities, normally visible through vegetation distress (or failing of boreholes).

In 2016, the MR Holder applied for water use authorisation for activities that trigger Section 21 (c) and 21(i) of the NWA, 1998. In April 2018, the general authorisation of Zandberg Sandput (Pty) Ltd was approved and water use certification 29005996 was issued for Section 21 (c) and (i) (NWA) activities.

4.8 MINING, BIODIVERSITY AND GROUNDCOVER

When the footprint of the proposed extension area is layered over the Mining and Biodiversity Guideline Map it falls over an area of highest biodiversity importance with a corresponding rating of highest risk for mining. The area of highest biodiversity importance also corresponds with the Langeberg CBA as identified in the 2017 Western Cape Biodiversity Spatial Plan.

During the EIA (associated with the S102 application), the layout of the proposed extension footprint was amended to concentrate mining to the less sensitive northern area where it will not contribute to negative cumulative impacts regarding the identified CBA.

According to Mucina and Rutherford (2012) the extension area lays over two vegetation types known as the Breede Sand Fynbos (FFd8) and the North Sonderend Sandstone Fynbos (FFs13).

The conservation status of the Breede Sand Fynbos is Vulnerable with the conservation target set at 30%, with none of the unit conserved in statutory conservation areas and only 2% protected in the Hawequas and Quaggas Berg Private Natural Reserve. Mucina and Rutherford reported that 45% of the area has been transformed mainly for pasture and vineyards, as well as a result of the Brandvlei and Kwaggaskloof Dams.

The conservation status of the North Sonderend Sandstone is Least Threatened with the conservation target set at 30%. 21% of the vegetation type is statutorily conserved in the Riviersonderend Nature Reserve, with an additional 51% mainly in a private conservation area of the same name. Mucina and Rutherford reported that only 2% of the area has been transformed mainly for protea nurseries and fruit orchards.

The footprint of the proposed expansion resembles pristine forms of Breede Sand Fynbos throughout the majority of the site, together with pristine North Sonderend Sandstone Fynbos in the Western and south-western corner, adjacent to drainage lines. In terms of Breede Sand Fynbos, there was some variability in habitat types, mostly related to vegetation cover, for example the existence of mobile dunes with sparse vegetation cover, progressing towards semi-mobile dunes with moderate cover, to stabilised sands/dunes with high vegetation cover.

The northern portion of the dune plume regarded as acceptable for the proposed activity covers approximately 30% of the original extent that is being proposed. The remaining area should be set aside to function as a biodiversity offset area.

4.9 CULTURAL AND HERITAGE ENVIRONMENT

ACO Associates CC compiled a Heritage Impact Assessment (HIA) of the proposed extension footprint. The HIA notes that although Later Stone Age (LSA) sites and materials are to be expected in the Breede River valley, the desktop study did not find record of such archaeological material. Similarly, although historical records confirm that the Breede River valley was visited by Khoekhoen pastoralist groups during the 18th century, their settlements have not been traced. Deacon (2007:2) notes that the gravels of the Breede River are associated with ESA artefacts, with reports of these artefacts being widely encountered in the plough zones of vineyards in the area. During the site survey, the specialist found no evidence of archaeological sites or material on the surface of the

earmarked dune. The specialist did not find any historic buildings or structures, cemeteries or graves within the surveyed area.

The HIA found that the earmarked extension area is not a sensitive heritage environment and that with the possible exception of palaeontological material, impacts on heritage resources arising from expanded mining operations are unlikely.

4.10 LAND CAPABILITY AND SURROUNDING LAND USE

Portion 4 of the farm Zandberg fontein No 97 is situated in a rural setting surrounded by other farming properties. The property is approximately 7 km south-west of Robertson bordering the La Chasseur/Agter-Kliphoogte road that serves the residents of the area. Certain sections of the farm are used for grazing, and sand mining. The earmarked property is zoned Agricultural Zone 1 with a consent use for mining approved for the current mining footprint. Agricultural Zone I has agriculture as primary use. In light of this, a land use application will be made in terms of the Langeberg Land Use Planning Bylaw (264/2015) and the Langeberg Municipality – Integrated Zoning Scheme Bylaw (7929/2018) to obtain land use rights for the proposed extension area.

5. ANNUAL REHABILITATION PLAN

Appendix 3 to the Financial Provision Regulations, 2015 states that the objectives of the annual rehabilitation plan are to:

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

5.1 IMPLEMENTATION AND REVIEW OF TIMEFRAMES

The annual rehabilitation plan will be applicable for a 12-month period commencing from the date of approval thereof by the Department of Mineral Resources and Energy. The

document will be reviewed during the 11th month of the operative period to ensure the timeous submission of the subsequent annual review.

5.2 MONITORING RESULTS

5.2.1 Control of Invasive Alien Vegetation

The Right Holder continuously monitors the mining footprint for the invasion of alien vegetation. Particular care is taken to prevent the establishment of Acacia species such as Port Jackson (*Acacia saligna*) or Rooikrans (*Acacia cyclops*) as well as the spreading of *Prosopis* species into the mining area. Currently, no invasive plant species are present within the mining footprint. This practice will continue should the extension of the mining area be approved.

5.2.2 Noise Monitoring

Noise emissions are monitored on site, and the operations adhere to the work hours stipulated in the EMPR. Due to the small scale of the operation the noise levels has to date been low and no complaints have been lodged in this regard. The monitoring of noise levels will continue should the extension of the mining area be approved.

5.2.3 Dust Monitoring

The Right Holder daily monitor dust levels that may increase as a result of the mining operations. The type of sand (heavy) being mined generates very little to no dust. The dust level of the gravel access road occasionally increases (dry periods) as a result of mining related traffic. To date no complaints were received regarding dust nuisance cause by the mining operations. This practice will continue should the extension of the mining area be approved.

5.2.4 Waste Monitoring

A chemical toilet has been placed at the mine that is serviced by a local contractor. The refuse of the operator or visitors to the mine is contained inside the site vehicles until it is incorporated into the existing waste disposal system of the farm, from where it is removed to the Robertson landfill. This practice will continue should the extension of the mining area be approved.

5.3 SHORTCOMINGS IDENTIFIED

This report is the first Annual Rehabilitation Plan in terms of the Financial Provision Regulations, 2015 that was compiled for the Zandberg Sand Mine. No shortcomings have therefore been identified.

5.4 REHABILITATION ACTIVITIES FOR THE FORTHCOMING 12 MONTHS

The Right Holder intends to mine ± 0.5 ha sand per year depending on market demand and sales. In light of this, it is proposed that at least 0.25 ha of the proposed 0.5 ha will be rehabilitated in a 12-month period.

5.5 REVIEW OF THE PREVIOUS YEAR'S REHABILITATION ACTIONS

This report is the first Annual Rehabilitation Plan in terms of the Financial Provision Regulations, 2015 that was compiled for the Zandberg Sand Mine. In this circumstance no annual rehabilitation activities have been identified that can be reviewed. Upon approval of the S102 amendment application and receipt of the EA, the Right Holder will annually report on the rehabilitation actions of the previous 12-months.

5.5.1 Areas planned to be rehabilitated

Not applicable.

5.5.2 Actual area rehabilitated or remediated

Not applicable.

5.5.3 Motivation for deviation from planned rehabilitation

Not applicable.

5.6 COSTING

The Right Holder proposes that the rehabilitation of a 0.25 ha area will cost approximately R 300 000.

6. REHABILITATION, DECOMMISSIONING AND MINE CLOSURE PLAN

The objective of the final rehabilitation, decommissioning and mine closure plan (According to MPRDA) is to identify a post-mining land use that is feasible through;

- a) Providing the vision, objectives, targets and criteria for final rehabilitation, decommissioning and closure of the project (as described above);
- b) Outlining the design principles for closure;
- c) Explaining the risk assessment approach and outcomes and link closure activities to risk rehabilitation;
- d) Detailing the closure actions that clearly indicate the measures that will be taken to mitigate and/or manage identified risks and describes the nature of residual risks that will need to be monitored and managed post closure;
- e) Committing to a schedule, budget, roles and responsibilities for final rehabilitation, decommissioning and closure of each relevant activity or item of infrastructure;
- f) Identifying knowledge gaps and how these will be addressed and filled;
- g) Detailing the full closure costs for the life of project at increasing levels of accuracy as the project develops and approaches closure in line with the final land use; and
- h) Outlining monitoring, auditing and reporting requirements.

(Financial provision regulations, 2015 appendix 4)

The following objectives are leading closure indicators, which need to be applied across all the domains, and read in conjunction with the principles, which embody the strategic objectives. The closure plan must address all the areas associated with closing the operations, of which rehabilitation and re-vegetation forms part of a component. The first step in developing the overall mine closure strategy is to identify potential post mining land use options and establish key objectives for closure to be incorporated in the project design.

The preferred post mining land use for the Zandberg Sand Mine is to restore the natural vegetation and return the area to agriculture zoning. In this context, the primary objectives for the closure of the mining operations are:

- ❖ Remove all temporary infrastructure and waste from the mine as per the requirements of this EMPR and of the Provincial Department of Minerals and Resources and Energy.
- ❖ Shape and contour disturbed areas in compliance with the EMPR.
- ❖ Ensure that permanent changes in topography (due to mining) are sustainable and do not cause erosion or the damming of surface water.
- ❖ Use the topsoil effectively to promote the re-establishment of vegetation.
- ❖ Ensure that all rehabilitated areas are stable and self-sustaining in terms of vegetation cover.

- ❖ Eradicate all weeds/invaser plant species by intensive management of the mine site.

6.1 CLOSURE STRATEGY GUIDED BY THE ENVIRONMENTAL RISK ASSESSMENT

The overall objective of the closure plan is to minimize adverse environmental impacts associated with the mining activity whilst maximising the future utilisation of the property. The idea therefore, is to leave the mined out areas in a condition that reduces all negative impacts associated with the activity. Significant aspects to be borne in mind in this regard is visibility of the mining scar, re-vegetation of the mining footprint, stability and environmental risk in an old mine environment. The rehabilitated and immediate surroundings must also be free of weeds and alien vegetation.

Rehabilitation will include activities to be divided into medium- and long term categories. In the medium term, rehabilitation will entail the continuous reinstatement and seeding of mined-out strips, and the management of weeds and invasive plant species. In the long term, rehabilitation will involve final landscaping of the site, the replacement of the topsoil on the final strip and the removal of the FEL prior to the submission of a closure application to the Department of Mineral Resources and Energy (DMRE). The MR holder will further be responsible for the seeding of all rehabilitated areas.

6.2 DESIGN PRINCIPLES

The MR Holder proposed the following regarding the rehabilitation of the mined-out strips:

- ❖ The mining plan will be such that topsoil is stockpiled for the minimum possible time through rehabilitating different mining blocks progressively as mining continues.
- ❖ To ensure minimum impact on drainage, the MR Holder will take care not to leave any depressions in the mining floor. A surface slope (even if minimal) will be maintained across the mining floor in the drainage direction, so that all excavations are free draining.
- ❖ After mining, any steep slopes at the edges of excavations will be reduced to a minimum and profiled to blend with the surrounding topography.
- ❖ The stockpiled topsoil will then be evenly spread over the entire mining area, so that there is a depth of 300 mm of sandy topsoil above the underlying soil. The depth will be monitored during spreading to ensure that coverage is adequate and even.

- ❖ The MR Holder will strive to (when possible) spread topsoil at a time of the year when vegetation cover can be established as quickly as possible afterwards, so that erosion of returned topsoil by both rain and wind, is minimized.
- ❖ A cover crop will be planted and established immediately after spreading of topsoil to stabilize the soil and protect it from erosion.
- ❖ The rehabilitated area as well as the land down slope of it will monthly be monitored for erosion, and appropriately stabilized if any erosion occurs.
- ❖ The MR Holder will ensure monthly monitoring of weeds/invaser plants that may germinated within the rehabilitated areas. An invasive plant species management plan will be implemented on site.

6.3 POST-MINING LAND USE

As mentioned earlier, the preferred post mining land use for the Zandberg Sand Mine is to restore the natural vegetation and return the area to agriculture zoning.

6.4 CLOSURE ACTIONS

The closure goals and objectives, stipulated in the Environmental Management Programme (EMPR), are to ensure that post-use rehabilitation achieves a stable and functioning landform consistent with the surrounding landscape, other environmental values and agreed land use.

As mentioned earlier, rehabilitation of the mining area will largely fall within two categories namely, those that will occur within the medium term when a strip is mined out, and those that will occur in the long term upon final closure of the site.

6.4.1 Medium Term Rehabilitation

In the medium term, progressive rehabilitation of mined-out strips will be done and will include the following closure objectives:

- ❖ Replace the stockpiled topsoil evenly over the mined-out area to a depth of 300 mm;
- ❖ Reduce any steep slopes at the edges of excavations to a minimum and profile it to blend with the surrounding topography;
- ❖ Maintain a surface slope (between 2 – 6%) across the mining area and out of it on the down-slope side to assist drainage;

- ❖ Seed the reinstated area with a seed mix of commercial- and native seeds including annuals and perennials to diversify rooting depths;
- ❖ Control invasive plant species for at least one growth season;
- ❖ Monitor the area for erosion until vegetation established.

6.4.2 Long Term / Final Rehabilitation

Upon closure of the mine, the Right Holder will commence with the reinstatement of the final strip and removal of the chemical toilet from site. The right holder will also comply with the minimum closure objectives as prescribed by DMRE and detailed below:

Rehabilitation of the excavated area:

- ❖ No waste may be permitted to be deposited in the mining area.
- ❖ The topsoil previously stored must be returned to its original depth over the area.
- ❖ The area must be fertilized if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally or regionally occurring flora, should natural vegetation not re-establish within six months from closure of the site.
- ❖ If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager (DMRE) may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area be seeded with a vegetation seed mix to his or her specification.

Final rehabilitation:

- ❖ Rehabilitation of the surface area shall entail landscaping, levelling, top dressing, land preparation, seeding (if required), maintenance, and clearing of invasive plant species.
- ❖ All equipment, plant, and other items used during the mining period must be removed from the site (section 44 of the MPRDA).
- ❖ Waste material of any description, including receptacles, scrap, rubble and tyres, must be removed entirely from the mining area and disposed of at a recognized landfill facility. It will not be permitted to be buried or burned on the site.

- ❖ The management of invasive plant species must be done in a sporadic manner during the life of the mining activities. Species regarded as Category 1a and 1b invasive species in terms of NEM:BA (National Environmental Management: Biodiversity Act 10 of 2004 and regulations applicable thereto) need to be eradicated from the site.
- ❖ Final rehabilitation must be completed within a period specified by the Regional Manager (DMRE).

6.4.3 Revegetation of Rehabilitated Areas

When a strip is mined-out, progressive rehabilitation must occur wherein a stable vegetation cover is established with a grass layer. The Botanical Study and Assessment (BSA), noted that though a stable vegetation cover will allow for some functionality to return, establishment of a natural fynbos cover representative of the region is near impossible. The BSA noted the following regarding the rehabilitation of sand fynbos:

- ❖ Sand Fynbos occurs on acidic, deep, loose, sandy soils which are easily destabilized and prone to wind erosion
- ❖ Wind-blown sand damages vegetation and makes it difficult to establish vegetation cover, therefore anti-soil erosion measures may be required.
- ❖ Disturbed areas are slow to self-repair, therefore active restoration (e.g. sowing and planting) will be required.
- ❖ Ecological restoration does not substitute for sustainably managing and protecting intact native ecosystems.
- ❖ Fynbos ecosystems are prone to invasion by alien species and alien plant invasion is the second biggest cause of biodiversity loss after direct habitat loss. The management and eradication of Invasive Alien Plants (IAPs) are therefore a critical portion of the rehabilitation process and a detailed IAP Management Plan is should be in place.

In light of this, the botanist recommended the use a mix of commercial seed and native seed, including both annuals and perennials to diversify rooting depths. For dryland areas, the commercial seed mix should be less than half the standard sowing rate and include annuals (e.g. wheat or rye) and perennials e.g. Kweek (*Cynodon dactylon*). Commonly available fynbos seeds (collected from as near to the site as possible) must be added, including annuals (e.g. *Arctotis arctotoides*, *Dimorphotheca chrysanthemifolia*, *D. nudiaulis*, *Helichrysum cymosum*, *Osteospermum oppositifolium*), grasses (*Ehrharta villosa*, *E. calycina*, *Festuca*

scabra and *Stipagrostis zeyheri*), succulents (*Carpobrotus edulus*, *Ruschia pungens*) and shrubs (e.g. *Athanasia quinqueidentata*, *Chrysocoma ciliata*, *Elytropappus rhinocerotis*, *Metalasia adunca*, *Stoebe nervigera*, *Eriocephalus africanus*, *Helichrysum odoratissimum* and *Agatoshma stipitata*). The collection of local fynbos seed, if possible, is preferable for establishing fynbos species in favour of introducing Kweek, as Kweek may suppress fynbos establishment, particularly in wetter areas.

6.4.4 Maintenance and Monitoring

Rehabilitated areas need to be monitored and managed after the initial rehabilitation. Zandberg Sand Mine's primary tool for maintenance of the rehabilitated area will be monitoring of the reinstated areas until the closure certificate was issued. If areas are identified that are considered unsatisfactory then maintenance may include, but not be limited to:

- ❖ Replanting failed or unsatisfactory areas;
- ❖ Repairing any erosion problems; and
- ❖ Pest and weed control.

6.4.5 Success Criteria and Monitoring

To assess when the rehabilitation and re-vegetation process is complete, Zandberg Sand Mine will develop a set of completion criteria. These criteria will be reviewed by senior management before being submitted to the regulatory authorities (DMRE) for approval and sign off.

The approved set of completion criteria will be used as a basis for assessing the closure of the mining operations, with the Zandberg Sand Mine required to comply with the specified criteria before the land management can be relinquished. The completion criteria will be reviewed every two years with the closure plan and updated to include findings of the Zandberg Sand Mine rehabilitation research and development program as well as additional requirements of the regulatory authorities.

When selecting completion criteria, consideration must be given to the climatic conditions in the area. Using simple percentage species and percentage cover may not be appropriate, as this is dependent on when the samples are taken. This will also be informed by the Botanical survey completed for the project. If the baseline was established during a wet year and the assessment undertaken during drought,

the criteria will not be met. The rehabilitated and re-vegetated areas will be monitored to determine the progress of the programme. Monitoring is likely to be a combination of methods and may include photographic monitoring, transects and standard plot areas.

6.4.6 Impact Specific Procedures

The table below provides a summary of the impact specific procedures associated with the closure of the mine.

Table 7: Summary of the impact specific procedures

CLOSURE MANAGEMENT OBJECTIVES	SPECIFIC PERFORMANCE CRITERIA	ACTION REQUIRED
SOCIO-ECONOMIC		
<ul style="list-style-type: none"> ❖ The retrenchment process will be followed as per requirements of the applicable legal process; and ❖ All existing social investments will be phased out over an agreed period with beneficiaries. 	<ul style="list-style-type: none"> ❖ Progressive rehabilitation must be implemented as mining progress. 	<ul style="list-style-type: none"> ❖ The Social and Labour Plan (SLP) must be audited on an annual basis; ❖ Any commitments made to I&AP'S will be attended to the relevant I&AP's satisfaction as agreed upon between the I&AP'S and the mine.
TOPOGRAPHY AND EROSION CONTROL		
<ul style="list-style-type: none"> ❖ The area will have contours constructed to prevent soil erosion. 	<ul style="list-style-type: none"> ❖ All slopes which may incur erosion will be profiled in such a way that a preferential down drain can be installed; ❖ Rehabilitated profiles must ensure free drainage of water and should be contoured to fit in with the catchment dynamics; ❖ Erosion control measures such as contour banks and cut off berms should be constructed and soil vegetated in rehabilitated areas. On gentle slopes, water will be encouraged to flow off the rehabilitated surface as surface flow, as quickly as possible without causing erosion. 	<ul style="list-style-type: none"> ❖ Should it be noted that designs are not being followed, rehabilitation activities will cease and corrective measures will be taken to ensure design specifications are achieved. Specialists will be consulted if necessary; ❖ Any pooling will be addressed by filling depression and / or grading areas and re-vegetating such sites; ❖ Any erosion will also be addressed utilising contour berms, gabion structures if necessary or a specialist will be consulted if necessary. Any eroded soils will be lifted and returned to the affected area; ❖ Any deficiencies will be corrected by placing material in these areas as per the closure plan; ❖ Any compacted soils will be ripped or disked and re-vegetated with indigenous flora. Vegetation will then be monitored in these areas; ❖ All recommendations made by the specialists will be implemented where deemed appropriate; ❖ An alien invasive management program will be implemented for the control and eradication of alien invasive species on site. This plan will give preference to mechanical control methods. Any chemicals utilised will be used responsibly. Where required DWS will be consulted with regards to the use of certain chemicals

CLOSURE MANAGEMENT OBJECTIVES	SPECIFIC PERFORMANCE CRITERIA	ACTION REQUIRED
ECOLOGY		
<ul style="list-style-type: none"> ❖ The rehabilitated area will be protected from surface disturbance to allow vegetation to establish and stabilise. 	<ul style="list-style-type: none"> ❖ Vegetation in rehabilitated areas will have equivalent values as surrounding natural ecosystems; ❖ The rehabilitated ecosystem will have equivalent functions and resilience as the target ecosystem; ❖ Soil properties will be appropriate to support the target ecosystem; ❖ The rehabilitated areas will provide appropriate habitat for fauna. 	<ul style="list-style-type: none"> ❖ Should it be noted that designs are not being followed, rehabilitation activities will be amended to ensure corrective measures will be taken to ensure design specifications are achieved. Specialists will be consulted if necessary; ❖ An alien invasive management programme will be implemented for the control and eradication of alien invasive species on site. This plan will give preference to mechanical control methods. Any chemicals utilised must be used responsibly.
LAND USE		
<ul style="list-style-type: none"> ❖ To ensure that rehabilitation is done to such an extent that land use potential is regained for agricultural use and associated zoning. 	<ul style="list-style-type: none"> ❖ Only after the levelled areas have been inspected and approved by the Mine Manager/Site Manager will topsoil be placed to a depth of 0.3 m. The topsoil layer must be as even as possible, i.e. it must be smooth and the depth must remain consistent throughout; ❖ Once the topsoil has been replaced, vehicle movement will be restricted to prevent compaction of the topsoil; ❖ Rehabilitated areas will be vegetated within the same growing season (at the end of the rainy season). A suitable seedbed will be prepared to enhance the penetration and absorption of water, thereby giving the seed the best possible chance to germinate. The seeding depth should be very shallow to provide better germination. For most grass species seeding depth is approximately 5-15 mm; ❖ Rehabilitated areas will be re-vegetated with local indigenous flora as far as possible; and ❖ Once the seed mixture has been sown, the land must be rolled to ensure consolidation around the seeds and effective moisture retention. 	<ul style="list-style-type: none"> ❖ N/A

6.5 CLOSURE SCHEDULE

As explained earlier the Mining Right holder intends progressive rehabilitation of each mined-out strip prior to opening the subsequent strip, thereby minimizing the denuded areas as a result of the mining activity. The Applicant is committed to rehabilitate each strip within the first week after mining of the area is completed.

At this stage it is proposed that the final rehabilitation of the mining area will take approximately a month to complete. Rehabilitation will, however, not be considered complete until the first cover crop is well established and therefore the rehabilitation phase will extend over at least a six-month period.

Control of invasive plant species is an important aspect after topsoil replacement and seeding has been completed in an area. Site management will implement an invasive plant species management plan during the 12-month aftercare period to address germination of problem plants in the area. Final rehabilitation shall be completed within a period specified by the Regional Manager.

According to the MPRDA Section 43 (4) refers to the issues of a closure certificate and stipulates the following:

“Section 43(4) Issuing of a closure certificate -

(4) An application for a closure certificate must be made to the Regional Manager in whose region the land in question is situated within 180 days of the occurrence of the lapsing, abandonment, cancellation, cessation, relinquishment or completion contemplated in subsection (3) and must be accompanied by the prescribed environmental risk report.

Table 8: Closure schedule

CLOSURE SCHEDULE	
DECOMMISSIONING / CLOSURE ACTION	TIMEFRAME
EACH MINED-OUT STRIP (OPERATIONAL PHASE)	
<ul style="list-style-type: none"> ❖ Replace the stockpiled topsoil over the mined-out area; ❖ Landscape and level the area to prevent any depressions and allow for agricultural activities; ❖ Seed reinstated area or arrange for planting of relevant cover crop. 	Approximately 1 week subsequent to area being mined-out.
FINAL MINED STRIP (DECOMMISSIONING PHASE)	
<ul style="list-style-type: none"> ❖ Replace the stockpiled topsoil over the mined-out area; 	Week 1 - 4

CLOSURE SCHEDULE	
DECOMMISSIONING / CLOSURE ACTION	TIMEFRAME
<ul style="list-style-type: none"> ❖ Landscape and level the area to prevent any depressions and allow for agricultural activities; ❖ Seed reinstated area or arrange for planting of relevant cover crop; ❖ Remove the Front-End-Loader and chemical toilet; ❖ Rip any compacted area; ❖ Level and landscape entire footprint area; ❖ Cover with topsoil; and ❖ Seed reinstated area, or arrange for planting of relevant cover crop 	
MAINTENANCE AND AFTER CARE	
<ul style="list-style-type: none"> ❖ Erosion Monitoring ❖ Weeds and Invader Plant Control 	12 months duration after final closure of the mining area

6.6 IMPLEMENTATION AND RESPONSIBILITY OF CLOSURE PLAN

Implementation of the closure plan is ultimately the responsibility of Zandberg Sandput (Pty) Ltd. Upon commencement of the closure phase daily compliance monitoring will be the responsibility of the site manager. The site manager will be responsible for ensuring compliance with the guidelines as stipulated in the EMPR as well as the prevention and/or rectification of environmental incidents. The right holder will appoint an Environmental Control Officer to oversee compliance of the rehabilitation/closure activities.

6.6.1 Site Management Responsibility List

- ❖ Inspect area for erosion, pooling and/or compaction;
- ❖ Floral surveys need to be conducted to monitor cover abundance, plant succession and community structure;
- ❖ Monitor any ecologically sensitive species should it be observed on site.

6.6.2 Management of Information and Data

The Closure Plan must include a description of the management strategies, and all information and data relevant to mine closures. These records are valuable during the all phases of mining to provide:

- ❖ A history of closure and implementation at the site;
- ❖ A history of past developments;
- ❖ Information for incorporation into state and national natural resource databases; and
- ❖ The potential for improved future land use planning and/or site development.

6.7 IDENTIFIED GAPS IN THE PLAN

The assumptions made in this plan, which relate to the closure objectives and associated impact on the receiving environment, stem from site-specific information gathered by the project team. No gaps in the Rehabilitation, Decommissioning and Mine Closure Plan could be identified.

6.8 RELINQUISHMENT CRITERIA FOR CLOSURE ACTIVITIES

The specific rehabilitation outcomes against which the effectiveness of completed rehabilitation must be measured are:

1. that the topography has been sufficiently smoothed without steep excavation edges to allow for cultivation;
2. that topsoil has been spread on the surface;
3. that there is a potential rooting depth of at least 30 cm, of non-compacted soil material, which is suitable for root growth, across the entire mining area;
4. that there are no non free-draining depressions across the surface;
5. that there is no visible erosion across the area, or down-slope of it as a result of mining, and that no part of the area has been left unacceptably vulnerable to erosion;
6. that a successful cover crop has been established across the entire area.

In addition to the above, the following relinquishment criteria is proposed for the closure activities of the mining area:

Table 9: Relinquishment criteria

RELINQUISHMENT CRITERIA FOR CLOSURE ACTIVITIES			
CATEGORY	RELINQUISHMENT CRITERIA	INDICATORS	REPORTING REQUIREMENTS
Removal of all equipment.	No visible man-made structures should remain.	Closeout inspection by site management upon end of decommissioning phase.	Photographic evidence that infrastructure has been removed.
Soil erosion	Implementation of erosion control measures or the establishment of vegetation in denuded areas.	Engineered structures to control water flow	Proof in final closure report that required structures are in place and functional.

RELINQUISHMENT CRITERIA FOR CLOSURE ACTIVITIES			
CATEGORY	RELINQUISHMENT CRITERIA	INDICATORS	REPORTING REQUIREMENTS
Vegetation	Seeding of a cover crop after topsoiling.	Biodiversity monitoring	Monitoring report
Invader plant management	Continuous management of invader plants until the establishment of the first cover crop.	Biodiversity monitoring	Monitoring report
Land Use	Land capability and productivity similar to that, which existed prior to mining.	Land capability and productivity	Comparison to equivalent areas.

6.9 CLOSURE COST ESTIMATE

Financial provision (Regulation 54 of the MPRDA, 2002) is the amount needed for the rehabilitation of damage caused by the operation, both at sudden closure during the normal operation of the project and at final, planned closure. This amount reflects what it will cost the Department to rehabilitate the area disturbed in case of liquidation or abscondance. Financial provision for environmental rehabilitation and closure requirements of mining operations forms an integral part of the MPRDA. Section 41 of the MPRDA and Regulations 53 and 54 promulgated in terms of the MPRDA deal with financial provision for mine rehabilitation and closure.

Based on the extent of the current disturbance and by utilising the Department of Mineral Resources and Energy guideline document for calculating financial provision Zandberg Sand Mine need to provide a financial provision value of R 62 592.83 (calculated September 2020). The financial provision amount does not exceed the value of the rehabilitation trust (see table below) in place with the DMRE, and therefore the right holder is not required to provide a shortfall. Refer to *Part B(1)(f)(i)(e) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline of the 2020 EMPR* for an explanation as to how the financial provision amount was calculated.

Table 10: Comparison of the financial provision calculation outcome, with the current financial guarantee at DMRE.

DOCUMENT	AMOUNT (RANDS)
2020 Financial Provision Calculation	R 62 592.83
Value of the combined rehabilitation trust in place at DMR	R 110 000.00
SURPLUS	R 47 407.17

6.10 MOTIVATION FOR AMENDMENTS MADE TO THE FINAL REHABILITATION, DECOMMISSIONING AND MINE CLOSURE PLAN.

Not applicable as no amendments were made to the Final Rehabilitation, Decommissioning and Mine Closure Plan.

7. MONITORING, AUDITING AND REPORTING

In compliance with applicable legislation, the mining right holder will conduct monitoring of the mining activities for the duration of the decommissioning and closure phase. The compliance of the site will be audited and reporting will be done to the relevant authorities. The table below stipulates the actions to be followed in this regard. Monitoring, auditing and reporting needs to be conducted until mine closure has been approved by the DMRE and the closing certificate obtained.

Table 11: Monitoring, auditing and reporting requirements

MONITORING, AUDITING AND REPORTING REQUIREMENTS			
AUDIT	RESPONSIBLE PERSON	FREQUENCY OF AUDIT	CLOSE OUT APPROACH
LEGISLATED AUDITING AND REPORTING			
Environmental Auditing	<u>Internal Review</u>		
	Site manager to ensure compliance with Environmental Management Programme and Closure Plan.	Daily compliance monitoring.	Any non-conformance must immediately be addressed by site management and weekly reported on.
	<u>External Auditing</u>		
	External Environmental Consultant	Annual auditing and reporting to the Department of Mineral Resources and Energy.	Depending on the significance of the findings, site management has a maximum of four weeks to address and close out auditing results.
Financial Provision Review	Financial Provision Review Greenmined Environmental (Pty) Ltd	Annual review of the financial provision, and reporting of the findings to the Department of Mineral Resources and Energy.	Should the review of the financial provision indicate a shortfall the holder of the right would increase the financial provision to meet the audited financial provision within 90 days from the date of the signature.
MONITORING			
Dust Monitoring	Site Management	Daily Dust Monitoring	Site management has a maximum of two weeks to develop and implement a dust management plan should the dust levels increase and such a plan is required by DMRE or the municipality.
Invader Plant Monitoring	Site Management	Annual Monitoring	Site management has a maximum of two weeks to review and implement the invader plant control plan should Category 1a & b plants in terms of the National Environmental Management: Biodiversity Act, 2004 (Act 15 of 1973) and the Alien and Invasive Species Regulations, 2014 (amended 2016) germinate on-site.

MONITORING, AUDITING AND REPORTING REQUIREMENTS			
AUDIT	RESPONSIBLE PERSON	FREQUENCY OF AUDIT	CLOSE OUT APPROACH
Noise Monitoring	Noise Monitoring Specialist	Quarterly Noise Monitoring	Site management has a maximum of one week to designate additional noise zone where applicable. Hearing protection equipment must be available to employees at all times.

7.1 SCHEDULE FOR REPORTING REQUIREMENTS

The following table stipulates the reporting requirements and how document updating will be handled:

Table 12: Reporting requirements

REPORTING REQUIREMENTS			
AUDIT	LEGISLATION	REPORTING REQUIREMENTS	UPDATE DISCLOSURE
Environmental Auditing	NEMA; EIA Regulations, 2014	Reporting on the environmental compliance of the mining area will be in accordance with Regulation 34 of the NEMA EIA Regulations, 2014. The environmental audit report will contain the information set out in Appendix 7 of the said Regulation.	The environmental audit report will indicate the ability of the EMPR and Closure Plan to adequately manage the activity. Should the reports not be sufficient, amendment will be proposed.
Financial Provision Review	NEMA Amendment Act, 2014 (Act No 25 of 2014) Financial Provision Regulations, 2015	Reporting on the financial provision for closure of the mining area will be in accordance with Section 24P of the NEMA Amendment Act, 2014 (Act No 25 of 2014) read with the Financial Provision Regulations 2015.	The auditor will report on the adequacy of the financial provision and any adjustments that need to be made to the financial provision.
Health and Safety Auditing	Occupational Health and Safety Act, 1993 Mine Health and Safety Act, 1996	Reporting on the health and safety compliance of the mining area will be in accordance with the Mine Health and Safety Act, 1996.	The safety manager will annually updates the Code of Practices applicable to the site.

8. ENVIRONMENTAL RISK ASSESSMENT REPORT

The objective of the environmental risk assessment report is to:

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

(Financial Provision Regulations, 2015 Appendix 4)

8.1 ASSESSMENT PROCESS USED TO IDENTIFY AND QUANTIFY LATENT RISKS

8.1.1 Methodology

The methodology for the assessment of the potential latent risks entailed the use of the following:

DEFINITIONS AND CONCEPTS

Environmental significance:

The concept of significance is at the core of impact identification, evaluation and decision-making. The concept remains largely undefined and there is no international consensus on a single definition. The following common elements are recognised from the various interpretations:

- ❖ Environmental significance is a value judgement
- ❖ The degree of environmental significance depends on the nature of the risk
- ❖ The importance is rated in terms of both biophysical and socio-economic values
- ❖ Determining significance involves the amount of change to the environment perceived to be acceptable to affected communities.

Significance can be differentiated into risk magnitude and risk significance. Risk magnitude is the measurable change (i.e. intensity, duration and likelihood). Risk significance is the value placed on the change by different affected parties (i.e. level of acceptability)

The concept of risk has two dimensions, namely the consequence of an event or set of circumstances, and the likelihood of particular consequences being realised (Environment Australia (1999) Environmental Risk Management).

Impact:

The positive or negative effects on human well-being and / or the environment.

Consequence:

The intermediate or final outcome of an event or situation OR it is the result, on the environment, of an event.

Likelihood:

A qualitative term covering both probability and frequency.

Frequency:

The number of occurrences of a defined event in a given time or rate.

Probability:

The likelihood of a specific outcome measured by the ratio of a specific outcome to the total number of possible outcomes.

Environment:

Surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation (ISO 14004, 1996).

Methodology to be used:

The environmental significance assessment methodology is based on the following determination:

Environmental Significance = Overall Consequence x Overall Likelihood

Determination of Overall Consequence:

Consequence analysis is a mixture of quantitative and qualitative information and the outcome can be positive or negative. Several factors can be used to determine consequence. For determining the environmental significance in terms of consequence, the following factors were chosen: Severity/Intensity, Duration and Extent/Spatial Scale. Each factor is assigned a rating of 1 to 5, as described in the tables below.

Determination of Severity / Intensity:

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects affects the biophysical and socio-economic environment.

The following table will be used to obtain an overall rating for severity, taking into consideration the various criteria.

Table 13: Monitoring Programmes

Type of criteria	Rating				
	1	2	3	4	5
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant / Non-harmful	Small / Potentially harmful	Significant/ Harmful	Great/ Very harmful	Disastrous Extremely harmful
Social/ Community response	Acceptable / I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ Sporadic complaints	Unacceptable / Widespread complaints	Totally unacceptable / Possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance/ Easily reversible	Low cost to mitigate	Substantial cost to mitigate/ Potential to mitigate impacts/ Potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate/ Little or no mechanism to mitigate impact Irreversible
Biophysical (Air quality, water quantity and quality, waste production, fauna and flora)	Insignificant change / deterioration or disturbance	Moderate change / deterioration or disturbance	Significant change / deterioration or disturbance	Very significant change / deterioration or disturbance	Disastrous change / deterioration or disturbance

Determination of Duration

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place.

Table 14: Rating of duration used in the assessment of potential latent risks

Rating	Description
1	Up to ONE MONTH
2	ONE MONTH to THREE MONTHS (QUARTER)
3	THREE MONTHS to ONE YEAR
4	ONE to TEN YEARS
5	Beyond TEN YEARS

Determination of Extent/Spatial Scale

Extent or spatial scale is the area affected by the event, aspect or impact.

Table 15: Rating of extent / spatial scale used in the assessment of potential latent risks

Rating	Description
1	Immediate, fully contained area
2	Surrounding area
3	Within Business Unit area of responsibility
4	Within the farm/neighboring farm area
5	Regional, National, International

Determination of Overall Consequence

Overall consequence is determined by adding the factors determined above and summarized below, and then dividing the sum by 3.

Table 16: Example of calculating overall consequence in the assessment of potential latent risks

Consequence	Rating
Severity	Example 4
Duration	Example 2

Consequence	Rating
Extent	Example 4
SUBTOTAL	10
TOTAL CONSEQUENCE: (Subtotal divided by 3)	3.3

Determination of Likelihood:

The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5, as described below and in tables 6 and 7.

Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken.

Table 17: Rating of frequency used in the assessment of potential latent risks

Rating	Description
1	Once a year or once/more during operation
2	Once/more in 6 Months
3	Once/more a Month
4	Once/more a Week
5	Daily

Determination of Probability

Probability refers to how often the activity or aspect has an impact on the environment.

Table 18: Rating of probability used in the assessment of potential latent risks

Rating	Description
1	Almost never / almost impossible
2	Very seldom / highly unlikely
3	Infrequent / unlikely / seldom
4	Often / regularly / likely / possible

Rating	Description
5	Daily / highly likely / definitely

Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2.

Table 19: Example of calculating overall likelihood in the assessment of potential latent risks

Consequence	Rating
Frequency	Example 4
Probability	Example 2
SUBTOTAL	6
TOTAL LIKELIHOOD (Subtotal divided by 2)	3

Determination of Overall Environmental Significance:

The multiplication of overall consequence with overall likelihood will provide the significance of the risk, which is a number that will then fall into a range of **insignificant risk**, **uncertain risk** or **Significant Risk**, as shown in the table below.

Table 20: Determination of overall significance in the assessment of potential latent risks

Significance or Risk	Insignificant risk (cc)	Uncertain risk (bb)	Potential significant risk (aa)
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 – 19.9

Qualitative description or magnitude of Environmental Significance

This description is qualitative and is an indication of the nature or magnitude of the Environmental Significance. It also guides the prioritisations and decision-making process associated with this event, aspect or impact.

Table 21: Description of environmental significance and related action required in the assessment of potential latent risks

Significance	An insignificant risk (cc)	A uncertain risk (bb)	A potential significant risk (aa)
Impact Magnitude	Impact is of very low order and therefore likely to have very little real effect. Acceptable.	Impact is of low order and therefore likely to have little real effect. Acceptable.	Impact is real and substantial in relation to other impacts. Pose a risk to the company. Unacceptable
Action Required	Maintain current management measures. Where possible improve.	Maintain current management measures. Implement monitoring and evaluate to determine potential increase in risk. Where possible improve	Improve management measures to reduce risk.

Based on the above, the significance rating scale has been determined as follows:

- A potential Risk (aa) Risks of a substantial order. Mitigation and / or remedial activity would be feasible but difficult, expensive, time-consuming or some combination of these.
- An uncertain risk (bb) Risk would be negligible. Almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap and simple.
- An insignificant risk (cc) There would be very small to no risk.

8.1.2 Description of Latent Risks

At this stage, no latent risks that will potentially arise during closure phase of the mining area were identified.

8.1.3 Results and Finding of Risk Assessment

Not applicable as no latent risks were identified.

8.1.4 Changes to the Risk Assessment Results

N/A

8.2 MANAGEMENT ACTIVITIES

No additional management activities are necessary as no latent risks were identified.

8.3 COST ESTIMATE

Not applicable as no latent risks were identified.

8.4 MONITORING, AUDITING AND REPORTING REQUIREMENTS


By reason of the fact that no latent risks with regard to the management of the mine were identified, no additional monitoring, auditing or reporting requirements are required at this stage.

9. CONCLUSION

This Closure Plan needs to be followed together with the EMPR and its amendments when it is decided that the end of mining has been reached. This document gives the necessary information when planning the rehabilitation of the mine together with the cost associated with the rehabilitation.

Zandberg Sandput (Pty) Ltd commits itself to providing all the necessary resources to ensure that the rehabilitation of the mine is done in such a way that will be acceptable to all parties involved.

10. SIGNATURE OF AUTHOR

NAME	SIGNATURE	DATE
Christine Fouche		21 September 2020

11. UNDERTAKING BY RIGHT HOLDER

I,, the undersigned and duly authorised thereto by that Zandberg Sandput (Pty) Ltd will comply with the provisions of the MPRDA and its Regulations as set out in Government Gazette no. 26275 (23 April 2004), as well as NEMA.

I have studied and understand the contents of this document and duly undertake to adhere to the conditions as set out therein, unless specifically or otherwise agreed to in writing.

Signed at on thisday of20.....

Name:

Designation:

12. REFERENCES

- ❖ Chamber of Mines of South Africa, 1981. Guidelines for the rehabilitation of land disturbed by surface product mining in South Africa, Johannesburg
- ❖ Department of Water Affairs and Forestry, 2003. Draft: A practical procedure for the identification and delineation of wetlands and riparian areas, Pretoria
- ❖ Department of Environmental Affairs and Tourism: Integrated Environmental Management Information Series: Impacts Significance
- ❖ Department of Water Affairs and Forestry (DWAF) (2007b) Best Practice Guideline A4: Pollution control dams. The Government Printer, Pretoria