PROPOSED PROSPECTING RIGHT ON PORTION 1,2, 3 AND THE REMAINDER OF THE FARM KLIPVLEY KAROO KOP 153, WEST COAST DISTRICT MUNICIPALITY, WESTERN CAPE PROVINCE.

REHABILITATION AND CLOSURE PLAN

NOVEMBER 2023

REFERENCE NUMBER: *WC30/5/1/3/2/1/ 10433 PR*

PREPARED FOR:
Mineral Sands Resources (Pty) Ltd
Tormin Mine, Geelwal Karoo Farm
Schaapvlei Road
Koekenaap
8146
Email: sibonelo@mineralcommodities.com

PREPARED BY:
Greenmined Environmental
Consultant: Zoë Norval
Tel: 021 851 2673
Cell: 084 585 5706
Fax: 086 546 0579
Email: zoe@greenmined.co.za

EXECUTIVE SUMMARY

Greenmined Environmental (Pty) Ltd is the consultants responsible for the prospecting right application, and in light of this, an Annual- and Final Rehabilitation, Decommissioning and Mine Closure Plan (*in aliis verbis* Closure Plan) was accordingly drafted for the proposed prospecting application.

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 prospecting activities at the end of the life of activities as reflected in the final rehabilitation, decommissioning and prospecting area 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:

Upon approval of the prospecting right application and receipt of the EA, the prosecting right holder will annually report on the planned rehabilitation actions.

Rehabilitation, Decommissioning and Prospecting area Closure Plan:

The decommissioning phase will entail the removal of the drill rig and any foreign material from site; progressive closing of the drill holes and using material from around the boreholes and landscaping any compacted surfaces (if needed) will be implemented as they move from one borehole to the next. Upon closure of the prospecting right the area will return to its natural state. Due to the nature of the activity no buildings or permanent infrastructure needs to be demolished and the access roads will remain intact to be used by the landowner.

The decommissioning activities will therefore consist of the following:

- Removal of all prospecting machinery from the prospecting area;
- Removal of the chemical toilet from the prospecting area;
- Capping of all the boreholes with sand material from around the boreholes; and
- Landscaping and replacing the topsoil (if removed);

- Controlling the invasive plant species.

Environmental Risk Assessment Report:

At this stage, no latent risks that will potentially arise during closure phase of the prospecting area were identified. By reason of the fact that no latent risks with regard to the management of the prospecting 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 prospecting claim or intention to prospect 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 prospecting area 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 prospecting area which is acceptable for final prospecting area 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, 2002 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 prospecting 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 prospecting 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

BAR	Basic Assessment Report
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EIS	Ecological Importance Sensitivity
ESA	Ecological Support Areas
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)
PAOI	Project Area of Influence
PES	Present Ecological State
WCMR	Waste Classification and Management Regulations
WWF	World Wildlife Fund

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

The applicant Mineral Sands Resources (Pty) Ltd, applied for environmental authorisation (EA) and a prospecting right to prospect Garnet (Abbrasive), Heavy Minerals (General) Leucoxcene, (Heavy Mineral) Monazite (Heavy Mineral), Rare Eaths, Rutile (Heavy Mineral), Zircon (Heavy Minerals), Ilmenite (hereafter referred to as mineral resource) over Portion 1,2, 3 and the Remainder of the farm Klipvley Karoo Kop 153, West Coast District Municipality, Western Cape Province.

Greenmined Environmental (Pty) Ltd ("Greenmined") is the consultants responsible for the prospecting right application, and in light of this, an Annual- and Final Rehabilitation, Decommissioning and Mine Closure Plan (*in aliis verbis* Closure Plan) was accordingly drafted for the proposed stone dolerite mine. This report (the Closure Plan) stipulates the rehabilitation methods to be followed in the restoration of the earmarked prospecting 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 during the EIA process.

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 PROPOSAL

In light of the above, Mineral Sands Resources (Pty) Ltd (hereinafter referred to as "the Applicant") intends applying for a prospecting right to prospect the above-mentioned mineral resource on Portion 1,2, 3 and the Remainder of the farm Klipvley Karoo Kop 153, West Coast District Municipality, Western Cape Province.

The proposed prospecting footprint applied for was approximately 3970 ha over the above-mentioned properties and all activities will be contained within the boundaries of the site. The proposed prospecting area is a natural area. And will involve the following invasive activities:

- **Surface Sampling**

Where heavy mineral concentrations are noted on surface 25-liter surface samples will be collected manually with a shovel and plastic sampling bag for concentration and laboratory analysis to determine the type of minerals present and the tenor of mineralization. Each pit will be ~ 50cm x 50cm in size and dug to a maximum depth of 1m. Each sample locality will be backfilled and fully rehabilitated concurrently with sampling.

- **Airborne geophysical survey to identify drill targets.**

A horizontal gradient fixed-wing magnetic and radiometric ("AMR") survey will be conducted by the Consultant Geophysicist under the direction of the project geologist to obtain maps and a report confirming drill targets. Geophysical surveys are designed to detect magnetism from target minerals such as magnetite and ilmenite and radiometric signatures of minerals such as ilmenite and zircon which are depicted as mineralization trends on geophysical survey maps. It is these trends that are targeted for drilling.

- **Auger Drilling.**

Handheld engine operated auger drill. The auger is portable and will be walked to site from the closest track. Approximately 100 auger drill holes are anticipated to be drilled. The auger is in essence a corkscrew-type drill where the helical ridge raises the drilled material to the surface for sampling purposes. A total of 100 drill holes are planned for initially to be collected over an estimated 18-month period.

- **Evaluation Air core Drilling**

Air-core drilling uses steel or tungsten blades to bore a hole into unconsolidated ground. The drill cuttings are removed by the injection of compressed air into the hole. This method of drilling is used to drill unconsolidated sands and soft sediments. Where possible, air-core drilling is preferred over RAB drilling as it provides a more representative sample. Air-core drilling is relatively inexpensive and is often used in first pass exploration drill programs. Air-core drilling is limited to depths of 50-60m.

DESCRIPTION OF PLANNED NON-INVASIVE ACTIVITIES:

(These activities do not disturb the land where prospecting will take place, e.g. aerial photography, desktop studies, aeromagnetic surveys, etc.)

Phase 1 and 5

Phase 1 will involve the following desk-top activities: data acquisition from government and private sources, and analysis of any existing/previous prospecting and drilling data, satellite (Landsat) imagery, aerial photos, and terrain data, as well as geological map interpretation. The synthesis and interpretation of such information will contribute towards providing a clearer picture of the location and characteristics of the heavy mineral deposit/s and will guide the in-field prospecting programme.

Airborne geophysical survey to identify drill targets. A horizontal gradient fixed-wing magnetic and radiometric ("AMR") survey will be conducted by the Consultant Geophysicist under the direction of the project geologist to obtain maps and a report confirming drill targets. Geophysical surveys are designed to detect magnetism from target minerals such as magnetite and ilmenite and radiometric signatures of minerals such as ilmenite and zircon which are depicted as mineralization trends on geophysical survey maps. It is these trends that are targeted for drilling.

Phase 5 will involve analytical desk-top study. All the data collected will be analysed and compiled into a final report/model in order to determine the potential of the project and to outline possible future drill sampling programs if any.

DESCRIPTION OF PLANNED INVASIVE ACTIVITIES

(These activities result in land disturbances e.g. sampling, drilling, bulk sampling, etc.)

Phase 2, 3 and 4

Phase 2: Surface mapping will be conducted by the project geologist and assistants and will take place over a period of 3 months. Such mapping will encompass GPS controlled traverses, and aerial photo mapping. Surface sampling. Where heavy mineral concentrations are noted on surface 25-liter surface samples will be collected manually with a shovel and plastic sampling bag for concentration and laboratory analysis to determine the type of minerals present and the tenor of mineralization. Each pit will be 50cm x 50cm in size and dug to a maximum depth of 1m. The final number of samples will be determined by the size of surface mineralized areas if any, 200 samples are planned for initially. Each sample locality will be backfilled and fully rehabilitated concurrently with sampling.

Phase 3 will involve surveying and pegging of the anticipated deposit. This sub-phase will include the following activities: Surveying of the mapped area to be prospected. A grid (average 500m x 500m) will be marked on the map, after which those positions

will be marked in the field by a surveyor with labelled droppers (pegs). Shallow small diameter auger drilling will take place at these positions to an average depth of 4m. A total of 100 auger drill holes are planned initially and may be followed up with additional drilling Access routes to the drill sites will also be located (existing roads will used and new tracks only permitted in exceptional circumstances).

Phase 4 will be conducted with Air Core drilling method to access the deeper lying sediment package. A total of 250 Air-core holes are planned down to an average depth of 30m. More drilling may be required depending on results. Drill cutting will be sampled and analysed for heavy mineral content as described above for surface sampling.

The footprint of each borehole site is ±50 m² that allows for the placing of the drill rig and vehicle. The applicant will not remove any topsoil due to the fast mobility of the drill rig and approximately 2 - 3 boreholes are planned to be operated per day. The boreholes will be capped with sand material from around the boreholes, and the area rehabilitated as they move to the next borehole.

DESCRIPTION OF PRE-/FEASIBILITY STUDIES:

(Activities in this section include but are not limited to: initial geological modelling, resource determination, possible future funding models, etc.)

A preliminary geological model will be compiled once the geological mapping and reconnaissance sampling and drilling have been completed. This will be done using standard software for the compilation of geological models and cross-sections from drill and sample data. Metallurgical and petrographical studies to determine the mineralogy, best processing and recovery system to upgrade the minerals to a saleable product.
Modelling of cut-off grades to determine if an inferred or indicated resource can be upgraded into reserve category. JORC or SAMREC compliant resource is the targeted outcome. Based on the resource model and planned processing method an economic feasibility

The prospecting site will contain the following:

- Surveying Equipment;
- Chemical toilet
- Drilling equipment;
- Geophysical logging equipment;
- Field Vehicles;

- Sample Analysis equipment; and
- Other relevant field equipment.

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 prospecting right 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 prospecting) are sustainable and do not cause erosion or the damming of surface water.
- Make all excavations safe.
- 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/invader plant species by intensive management of the prospecting site.

2. DETAILS OF THE AUTHOR

The Applicant, Mineral Sands Resources (Pty) Ltd, appointed Greenmined Environmental to prepare the final rehabilitation, decommissioning and prospecting area closure plan. Ms Zoe Norval is the responsible consultant for the project and has a Bsc degree in Environmental Science and an Honours degree in Botany. In her Honours year, she focused mainly on environmental assessments and geographic information systems. She has two years of experience in environmental services, Environmental Control and Environmental Performance Assessments / Compliance Audits, preparation of environmental related documentation, Mining Right and Permit

applications and applications for Environmental Authorisations. Please find full CV attached in Appendix J.

Name of the Practitioner: Ms Zoë Norval (Junior Environmental Specialist)

Tel No.: 021 851 2673

Fax No.: 086 546 0579

E-mail address: zoe@greenmined.co.za

Declaration of Independence:

I, Zoe Norval, 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.

Prepared by: Zoe Norval	Date:
	25 June 2023
Reviewed by: Sonette Smit (Senior Environmental consultant	
	

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	*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.*
	Section 38	*Requires the applicant to manage all environmental impacts in accordance with his or her environmental management plan (EMP) or the approved EMPR.*
	Section 39	*Deals with the requirements of an EMP/EMPR, whichever is applicable.*
Financial Provision	Section 41	*Financial provision needs to be provided and annually asses the environmental liability.*
Closure Certificate	Section 43	*Holder of a mining permit 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.*
Removal of Infrastructure	Section 44	*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.*

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)	*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.*
Mine Closure	Regulation 43	*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.*
Part III of R 527 deals with environmental regulations for mineral development, petroleum exploration and production.	Regulation 56	*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.*

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	*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.*
Control of emergency incidents.	Section 20	*Incidences of pollution needs to be reported the Department and the relevant catchment agency*
General principles: Water uses	Section 21	*The MR Holder has a valid General Authorisation issued by DWS in 2017.*

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	*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.*

AREA OF CONCERN	SECTION	LEGAL REQUIREMENTS
Control of emergency incidents.	Section 30	*Incidences of pollution needs to be reported the Department.*
Environmental Management Plan.	Section 34	*A EMP must include –* *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 –* *(iv) rehabilitation of the environment;* *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.*

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 permit are allowed a transitional period of 39 months (19 February 2019) from the date of promulgation to comply. The compliance date was extended to June 2021.

As mentioned earlier the prospecting 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 brining 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 the 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 prospecting right application was lodged over 3970 ha over Portion 1,2, 3 and the Remainder of the farm Klipvley Karoo Kop 153, West Coast District Municipality, Western Cape Province. The table below lists the GPS coordinates of the proposed mining footprint.

Table 5: GPS coordinates of the proposed prospecting footprint.

Name	DECIMAL DEGREES	
	LONG (E)	LAT (S)
A	17.94216°	-31.39091°
B	17.97082°	-31.38289°
C	17.97398°	-31.38706°
D	17.99670°	-31.41602°
E	18.01963°	-31.44521°
F	18.06056°	-31.49722°
G	18.04609°	-31.50950°
H	17.99369°	-31.45015°
I	17.97715°	-31.42784°
J	17.95840°	-31.41048°
K	17.94216°	-31.39091°

*Figure 1: Satellite view showing the position of Site Alternative 1 (purple polygon) within the surrounding landscape.**no alternative was identified for this site**.*

4.2 PROPOSED PROSPECTING OPERATION

4.2.1 Demarcation of Prospecting Boundaries

Pursuant to receipt of the Environmental Authorisation (EA) and Prospecting Right (PR), and prior to site establishment, the boundaries of the prospecting area will be demarcated with visible beacons.

4.2.2 Access Road

Access routes to the drill sites will also be located (existing roads will used and new tracks only permitted in exceptional circumstances).

4.2.3 Vegetation Clearing

No vegetation will be cleared for the prospecting activities.

4.2.4 Topsoil Stripping

No topsoil will be removed during the prospecting activities.

4.2.5 Introduction of Prospecting Machinery and Site Equipment

The applicant plans to establish an area of ±50 m² around each borehole for the placing of the drill rig and vehicle.

The prospecting site will contain the following:

- Surveying Equipment;
- Chemical toilet
- Drilling equipment;
- Geophysical logging equipment;
- Field Vehicles;
- Sample Analysis equipment; and
- Other relevant field equipment.

4.3 OPERATIONAL PHASE

The operational phase can be described in the following phases:

Phase 2, 3 and 4

Phase 2: Surface mapping will be conducted by the project geologist and assistants and will take place over a period of 3 months. Such mapping will encompass GPS controlled traverses, and aerial photo mapping. Surface sampling. Where heavy mineral concentrations are noted on surface 25-liter surface samples will be collected manually with a shovel and plastic sampling bag for concentration and laboratory analysis to determine the type of minerals present and the tenor of mineralization. Each pit will be 50cm x 50cm in size and dug to a maximum depth of 1m. The final number of samples will be determined by the size of surface mineralized areas if any, 200 samples are planned for initially. Each sample locality will be backfilled and fully rehabilitated concurrently with sampling.

Phase 3 will involve surveying and pegging of the anticipated deposit. This sub-phase will include the following activities: Surveying of the mapped area to be prospected. A grid (average 500m x 500m) will be marked on the map, after which those positions will be marked in the field by a surveyor with labelled droppers (pegs). Shallow small diameter auger drilling will take place at these positions to an average depth of 4m. A total of 100 auger drill holes are planned initially and may be followed up with additional drilling Access routes to the drill sites will also be located (existing roads will used and new tracks only permitted in exceptional circumstances).

Phase 4 will be conducted with Air Core drilling method to access the deeper lying sediment package. A total of 250 Air-core holes are planned down to an average depth of 30m. More drilling may be required depending on results. Drill cutting will be sampled and analysed for heavy mineral content as described above for surface sampling.

4.4 TOPOGRAPHY

The project area is flat to slightly undulating landscape of coastal peneplain. Vegetation is low species-rich shrubland dominated by a plethora of erect and creeping succulent shrubs (Cephalophyllum, Didelta, Othonna, Ruschia, Tetragonia, Tripteris, Zygophyllum) as well as nonsucculent shrubs (Eriocephalus, Lebeckia, Pteronia, Salvia). Annual mixed with perennial flora can present spectacular displays in wet years. The altitude varies between 8 –128 m.

Figure 2: Elevation profile of the proposed prospecting footprint (Image obtained from Google Earth).

4.5 AIR AND NOISE QUALITY

The proposed activity will contribute the emissions of drilling rigs and a field vehicle to the receiving environment for the duration of the operational phase. Should the prospecting holder implement the mitigation measures proposed in the BAR and the EMPR the impact on the air quality of the surrounding environment is deemed to be of low significance and compatible with the current land use. The potential impact on the noise ambiance of the receiving environment is expected to be of low significance.

4.6 GEOLOGY

The project area is generally underlain by rocky coastal plain which is extensively blanketed by an unconsolidated Cenozoic sedimentary cover. The Cenozoic deposits extending northward from Elands Bay to Alexander Bay are classified as the West Coast Group. The bulk of the overlying sediments occurs as marine- aeolian couplets with lithologic successions that are increasingly more marine in proportion north of Doring Bay. Conversely, the aeolian component turns dominant south of Hondeklip Bay. Generally, the basal, shallow-marine deposits rest unconformably on four main wave-cut, raised terraces corresponding to late Miocene and Pliocene sea-level transgressive maxima around 90, 50, 30, and 10 m amsl (meters above mean sea level). Heavy minerals, however, are concentrated in both marine and aeolian sediments, particularly north of Doring Bay

4.7 HYDROLOGY

The proposed site falls within the Olifants/ Doorn Water Management Area, in the E33G quaternary catchment area. According to the Aquatic Biodiversity Compliance Statement, it was confirmed during the site inspection that depression wetland and non-perennial rivers were present on the prospecting right application area.

The depression wetland is considered natural with limited disturbance impacts. The wetland has a high clay content and due to heavy rainfall, little to no plants are found within the depression (figure below). With heavy rainfall, the depression will be saturated and is highly likely to function as a foraging ground and habitat for various fauna. This is also given the large natural and intact area around the depression which supports a high diversity plant species.

The non-perennial river supports a high abundance and diversity of large shrubs such as *Roepera morgsana, Caroxylon aphyllum, Osteospermum monstrosum, and Lycium cinereum.* These rivers are in good ecological condition and are likely to support a variety of ecosystem services such as foraging ground for fauna. Some of the identified non-perennial rivers are included in Ecological Support Areas (ESA). Given that the rivers are in good condition, these specific rivers are expected to contribute significantly to functioning of the ESA. The rivers have been subject to some disturbance, including the development of roads and downstream mining activities which is expected to affect the functioning of these rivers.

Figure 19: Watercourses on the prospecting right area footprint (demarcated in black)

Present Ecological State (PES) is a measure of aquatic ecosystem condition, compared to that of the system in its natural or “reference” condition. The depression wetland and the perennial rivers have PES scores of B. The watercourses are largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged. Factors that have contributed are changes in the catchment hydrology and land use that contributes the small changes in flow, and changes to the channel characteristics by the development of a roads.

The wetland and the rivers can be classified as have an EIS category of B, thus being classified as ecologically important and sensitive. Biodiversity may be sensitive to flow and habitat modifications. These watercourses have been impacted by current and past agriculture, and road infrastructure. The habitat and species richness are ecologically significant. During high rainfall events, the river can provide some stormwater management, erosion control, flood attenuation and does provide a breeding and feeding ground to various faunal species.

The proposed prospecting works are planned within delineated rivers and a wetland. Buffer/regulated areas around the watercourses have been recommended based on Buffer Zone Guidelines for Wetlands, Rivers, and Estuaries. A general 17 m buffer around the rivers and 15 m around depression wetland has been recommended to mostly reduce the risk of sediment loading and erosion.

Figure 20: Watercourses on the prospecting right area with their respective buffers (red line).

The specific drilling sites are expected to be within 500m and 100m of the rivers and a wetland. However, the rivers area expected to be overall impacted by grazing, downstream mining activities and the development of a road. The PES and EIS of the rivers and wetland is concluded to be B.

In terms of conservation significance, the rivers included in the Ecological Support Areas as a whole are expected to contribute to the Ecological Support area functioning and objectives. The wetland and rivers are likely to inhabit various aquatic fauna and flora, provide ecosystem services and has good levels of ecosystem functioning. Therefore, the rivers and wetland are still necessary for some species to be maintained and efforts to improve the condition of the rivers should be invested in.

Taking into consideration the expected sensitivity of the footprint, sensitive features identified by the Screening Tool, the results from the expected baseline biodiversity and ecosystem of the site, it can be concluded that the development footprint is of low sensitivity for the Aquatic Biodiversity Theme, given that the drilling sites will avoid the watercourses and their respective buffers. Should the drilling sites be developed in the watercourses or within the buffers, the sensitivity rating will be increased to medium-high.

The applicant is in the process of applying for a water uses authorisation to the Department of Water and Sanitation, in terms of the National Water Act, 1998 (Act No 36 of 1998) which will be submitted for the Section 21 (c) and (i) waters uses.

4.8 TERRESTRIAL BIODIVERSITY, CONSERVATION AREAS AND GROUNDCOVER

The prospecting activities does not require the removal of any large trees or vegetation of significance. Due to the small footprint of a borehole, the drill position can be manipulated to drill between the trees. In light of this, the impact of the prospecting operation on the vegetation cover of the receiving environment is deemed to be of Low significance. The Applicant will make use of the existing access roads. It is proposed that should the Applicant implement the mitigation measures proposed in the EMPr the impact of the proposed activity on the vegetation and groundcover in general is deemed to be of low significance.

According to the Terrestrial Impact Assessment (Appendix M1), the proposed development footprint is situated in- and is surrounded by a Critical Biodiversity Area (CBA), Other Natural Areas and Aquatic Ecological Support Areas, as shown in the figure below.

Figure 21: Sensitivity of the proposed prospecting footprint (image obtained from Appendix M1)

Most of the prospecting footprint is in good ecological condition and represents the indigenous vegetation types. These are likely to contribute to the overall ecological functioning of the area. These areas are also of conservation importance given that they are classified as a Critical Biodiverse Area/Other Natural Area. The Site Ecological Importance (SEI) of the footprint was evaluated as Medium for each of the habitat units. Therefore, impacts should be minimised, and restoration activities should follow disturbance. Development activities of medium impact acceptable followed by appropriate restoration activities.

In addition, some species of conservation were recorded in the prospecting footprint and the area is likely to provide habitat for those species (as identified by the DFFE Screening Tool) not observed during the site inspection. It must also be noted that various provincially protected species were recorded on the footprint (not identified by the Screening Tool). For the aforementioned species, a Plant Removal Permit must be applied for before they can be removed. It is recommended that search and rescue operations be conducted prior to construction to ensure that all SCC's are properly translocated to suitable alternative habitats. Areas within the Critical Biodiverse Areas must be avoided as far as practically possible.

4.9 CULTURAL AND HERITAGE ENVIRONMENT

During the environmental impact assessment process the feasibility of the proposed site was assessed to identify fatal flaws that are deemed as severe as to prevent the activity continuing, or warrant a site or project alternative. The outcome of the assessment showed that should the mitigation measures and monitoring programmes proposed in this document be implemented, no fatal flaws could be identified that prevents the activity continuing.

4.10 LAND CAPABILITY AND SURROUNDING LAND USE

Portion 1,2, 3 and the Remainder of the farm Klipvley Karoo Kop 153, West Coast District Municipality, Western Cape Province is situated in a rural setting. The current surrounding land uses can be classified as agricultural land, existing mining and tourism and wind power station.

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-prospecting land use, closure vision and objectives identified 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 prospecting right holder will continuously monitor the 50m^2 prospecting area for the invasion of alien vegetation in accordance with the Invader Plant Species Management Plan of the site (Appendix N of the BAR & EMPR). This practice will continue through-out the different prospecting phases of the project.

5.2.2 Noise Monitoring

The prospecting right holder must ensure that employees and staff conduct themselves in an acceptable manner while on site. No loud music may be permitted at the prospecting area. All prospecting vehicles must be equipped with silencers and maintained in a road worthy condition in terms of the National Road Traffic Act, 1996 (Act No 93 of 1996). Best practice measures shall be implemented in order to minimize potential noise impacts. No prospecting from Sunrise until 09:00 and 16:00 and Sunset to minimise noise disturbance during their peak activity times. Allowing for vocalisation. Noise generated on-site from all the proposed activities must comply with the Western Cape Noise Control Regulations Provincial Notice 200/2013.

5.2.3 Dust Monitoring

Site management must ensure that the dust generating activities at the site comply with the National Dust Control Regulations, GN No R827 promulgated in terms of NEM:AQA, 2004 and ASTM D1739 (SANS 1137:2012). Dust levels will be controlled through the management processes stipulated in the BAR & EMPR.

5.2.4 Waste Monitoring

Site management will be responsible to monitor the generation of all types of waste at the prospecting area, including general-, hazardous- and liquid waste. Solid (general) waste, generated during the operational phase, will be contained in sealable refuse bins that will be placed at the office area until the waste is transported to a recognised general waste landfill site. A recognized contractor will service the chemical toilets that will serve as ablution facilities to the employees.

Hazardous waste (such as spills) will be cleaned up immediately and the contaminated soil will be contained in designated hazardous waste containers that

will be kept in a bunded area with impermeable surface until it is removed from site by a registered hazardous waste handling contractor to an approved facility.

Any event resulting in the spill or leak of hydrocarbons or any other hazardous solvents into the ground and/or water resources, must be reported within the prescribed timeframes to all relevant authorities, including the Directorate: Pollution and Chemicals Management. Containment, clean-up and remediation must commence immediately in the case of NEMA section 30 incidents, and the necessary documentation must be completed and submitted within the prescribed timeframes.

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 proposed prospecting right. No shortcomings have therefore been identified.

5.4 REHABILITATION ACTIVITIES FOR THE FORTHCOMING 12 MONTHS

Not yet applicable as prospecting has not yet commenced. Upon approval of the prospecting right application and receipt of the EA, the prospecting right holder will annually report on the planned rehabilitation actions.

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 proposed prospecting right. In this circumstance no annual rehabilitation activities have been identified that can be reviewed.

5.6 COSTING

To be determined once the annual rehabilitation objectives were established.

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-prospecting 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 prospecting land use options and establish key objectives for closure to be incorporated in the project design.

The preferred post prospecting land use for the proposed prospecting is to restore the natural vegetation (where possible). In this context, the primary objectives for the closure of the prospecting operations are:

- Remove all temporary infrastructure and waste from the prospecting area 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 prospecting) are sustainable and do not cause erosion or the damming of surface water.
- Make all excavations safe.
- Use the topsoil (if applicable) 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/invader plant species by intensive management of the prospecting area 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 prospecting activity whilst maximising the future utilisation of the property. The idea, therefore, is to leave the borehole 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 prospecting scar, re-vegetation of the prospecting footprint, stability and environmental risk in an old prospecting area environment. The rehabilitated and immediate surroundings must also be free of weeds and alien vegetation.

6.2 DESIGN PRINCIPLES

The applicant plans to establish an area of ±50 m² around each for the placing of the drill rig and vehicle. Progressive closing of the drill holes and using material from around the boreholes and landscaping any compacted surfaces (if needed) will be implemented as they move from one borehole to the next. Upon closure of the prospecting right the area will return to its natural state. Due to the nature of the activity no buildings or permanent infrastructure needs to be demolished and the access roads will remain intact to be used by the landowner.

The decommissioning activities will therefore consist of the following:

- Removal of all prospecting machinery from the prospecting area;
- Removal of the chemical toilet from the prospecting area;
- Capping of all the boreholes with sand material from around the boreholes; and
- Landscaping and replacing the topsoil (if removed);
- Controlling the invasive plant species.

The PR Holder will comply with the minimum closure objectives as prescribed DMRE and detailed below:

- Final Rehabilitation:

Final rehabilitation of the surface area shall entail landscaping, levelling, maintenance, and clearing of invasive plant species (if applicable). All equipment,

plant and other items used during the prospecting period will be removed from site (section 44 of the MPRDA, 2002). Waste material of any description will be removed from the prospecting area and disposed of in line with the company's waste management procedure. It will not be permitted to be buried or burned on the site. The replacement of topsoil in areas surrounding the development footprint should be sought in situ immediately after the disturbance. The management of invasive plant species will be done (if applicable) in a sporadic manner during the life of the activity. 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) will be eradicated from the site. All re-growth of invasive vegetative material must be monitored by the Applicant during the decommissioning phase of the development. Final rehabilitation shall be completed within a period specified by the Regional Manager. All areas under rehabilitation are to be treated as no-go areas using danger tape and steel droppers/fencing and cordoned off, to prevent vehicular, pedestrian and livestock access. Rehabilitation structures must be inspected regularly for the accumulation of debris, blockages, instabilities, and erosion with concomitant remedial and maintenance actions..

Once the prospecting area was rehabilitated the PR Holder is required to submit a closure application to the Department of Mineral Resources in accordance with section 43(4) of the MPRDA, 2002 that states: *"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".* The Closure Application will be submitted in terms of Regulation 62 of the MPRDA, 2002, and Government Notice 940 of NEMA, 1998 (as amended).

6.3 POST-PROSPECTING LAND USE

The preferred post prospecting land use for the proposed prospecting is to restore the natural vegetation (where possible) and return the area to its previous state. The pre-and-post-prospecting environments will be largely the same. Therefore, the loss of agricultural production potential as a result of the prospecting is insignificant.

6.4 CLOSURE ACTIONS

The closure goals and objectives 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.

The applicant will comply with the minimum closure objectives as prescribed by the DMRE and detailed below:

- Rehabilitation of the surface area shall entail landscaping, levelling, top dressing, land preparation, seeding and maintenance, and weed / alien clearing.
- All Temporary Infrastructures, equipment, plant, temporary housing and other items used during the prospecting period will be removed from the site.
- Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the prospecting area and disposed of at a recognized landfill facility, proof of this removal will be kept on file at the applicant's office. It will not be permitted to be buried or burned on the site.
- Weed / Alien clearing will be done in a sporadic manner during the life of the prospecting activities. Species regarded as the National Environmental Biodiversity Act [NEMBA] (Act No. 10 of 2004) Alien and Invasive Species Regulation GNR 598 and 599 of 2014 Species regarded as need to be eradicated from the site on final closure.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.

6.4.1 Revegetation of Rehabilitated Areas

In the unlikely event where topsoil and vegetation are removed, the area can be fertilized during the decommission phase to hasten the establishment of flora. Should the site's natural vegetation not grow back within six months of its closure to

spread the naturally existent flora in the area, the site could be seeded with a local or adapted indigenous seed mix. This area is seen to have low agricultural potential due to the rocky surface therefore the use of seed mixes should only be done after consultation with a qualified specialist with experience in the area as it might not apply. The use of a commercial seed mix is recommended, which should be less than half the standard sowing rate and include annuals and perennials.

6.4.2 Maintenance and Monitoring

Rehabilitated areas need to be monitored and managed after the initial rehabilitation. The proposed prospecting right's primary tool for maintenance of the rehabilitated area will be monitoring of the reinstated areas until the closure certificate is 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.

6.4.3 Success Criteria and Monitoring

To assess when the rehabilitation and re-vegetation process (if applicable) is complete, the prospecting area 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 prospecting operations, with the prospecting right 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 prospecting area 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. 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.

6.4.4 Impact Specific Procedures

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

Table 6: Summary of the impact specific procedures

CLOSURE MANAGEMENT OBJECTIVES	SPECIFIC PERFORMANCE CRITERIA	ACTION REQUIRED
SOCIO-ECONOMIC		
• 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.	• Progressive rehabilitation must be implemented if possible, as prospecting progress.	• 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		
• The area will have contours constructed to prevent soil erosion.	• The boreholes will be filled using material from around the boreholes and landscaping any compacted surfaces (if needed) will be implemented as they move from one borehole to the next.	• 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 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.
ECOLOGY		
• The rehabilitated area will be protected from surface disturbance to allow vegetation to establish and stabilise.	• 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;	• 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;

CLOSURE MANAGEMENT OBJECTIVES	SPECIFIC PERFORMANCE CRITERIA	ACTION REQUIRED
	• Soil properties will be appropriate to support the target ecosystem; • The rehabilitated areas will provide appropriate habitat for fauna. • The borehole depth will also be limited so as not to cause a major depression and at the same time assist with the free draining	• 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. • All areas under rehabilitation are to be treated as no-go areas using danger tape and steel droppers/fencing and cordoned off, to prevent vehicular, pedestrian and livestock access.

6.5 CLOSURE SCHEDULE

At this stage it is proposed that progressive rehabilitation will take place of each 50m^2 as they move from one borehole to the next. The applicant will not remove any topsoil due to the fast mobility of the drill rig and approximately 2 - 3 boreholes are planned to be operated per day. The boreholes will be capped with sand material from around the boreholes. Thus, rehabilitation will be done on a daily basis.

Control of invasive plant species is an important aspect after topsoil replacement (if applicable) 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.*

IMPLEMENTATION AND RESPONSIBILITY OF CLOSURE PLAN

Implementation of the closure plan is ultimately the responsibility of Mineral Sands Resources (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 prospecting right holder will appoint an Environmental Control Officer to oversee compliance of the rehabilitation/closure activities.

6.5.1 Site Management Responsibility List

- Inspect area for erosion, pooling and/or compaction;
- Monitor any ecologically sensitive species should it be observed on site.

6.5.2 Management of Information and Data

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

6.6 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.

6.7 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 rehabilitated without unsafe excavation edges;
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 prospecting area;
4. that there is no visible erosion across the area, or down-slope of it as a result of prospecting, and that no part of the area has been left unacceptably vulnerable to erosion;
5. that a successful cover crop has been established across the area.

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

Table 7: 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.
Vegetation	If the natural vegetation does not grow back within 6 months, then seeding of a cover crop after topsoiling is required.	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 prospecting.	Land capability and productivity	Comparison to equivalent areas.

6.8 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 abscondence. Financial provision for environmental rehabilitation and closure requirements of prospecting 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 the proposed prospecting right needs to provide a financial provision value of R 58,186.83. (calculated March 2023). 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 2023 BAR & EMPR for an explanation as to how the financial provision amount was calculated.

6.9 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 prospecting right holder will conduct monitoring of the prospecting 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 prospecting right closure has been approved by the DMRE and the closing certificate obtained.

Table 8: 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	**Internal Review**		
	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.
	External Auditing		
	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	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 permit 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 9: Reporting requirements

REPORTING REQUIREMENTS			
AUDIT	**LEGISLATION**	**REPORTING REQUIREMENTS**	**UPDATE DISCLOSURE**
Environmental Auditing	NEMA; EIA Regulations, 2014	Reporting on the environmental compliance of the prospecting 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 prospecting 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 prospecting 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) quantity 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 10: 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 11: 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 12: 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 13: 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 14: 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 15: 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 16: 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 17: 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 18: 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 prospecting 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 prospecting right 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 prospecting has been reached. This document gives the necessary information when planning the rehabilitation of the prospecting right together with the cost associated with the rehabilitation.

Otter Mist Trading 1057 (Pty) Ltd pledges to provide all necessary resources to guarantee that the rehabilitation of the prospecting right is carried out in a manner that will be deemed acceptable by all parties.

10. SIGNATURE OF AUTHOR

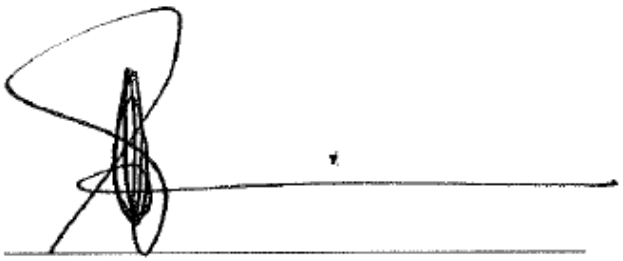
NAME	SIGNATURE	DATE
Zoë Norval		30 October 2023

11. UNDERTAKING BY PROSPECTING RIGHT HOLDER

I, SIBONELO PLACID MKHIZE, the undersigned and duly authorised thereto by BOARD OF DIRECTORS - MSR that Mineral Sands Resources (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 TORMIN on this 01 day of NOVEMBER 2023



Name: SIBONELO PLACID MKHIZE

Designation: GENERAL MANAGER

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

REHABILITATION PLAN

NORTHERN AND SOUTHERN STRANDLINE, TORMINE MINE, SOUTH AFRICA

SEPTEMBER 2021

Prepared for:

MSR

Prepared by:

Megan Smith
Megan.smith@enviroworks.co.za

Contents

List of Figures

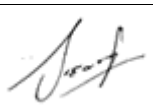
List of Tables

1. DOCUMENT CONTROL

1.1. Quality and revision record

1.1.1. Quality approval

	Capacity	Name	Signature	Date
Author:	Ecological Specialist	Megan Smith		1/09/2021
Reviewer 1	Ecological Specialist and Project manager	Elana Mostert		1/09/2021

Reviewer 2	Director Enviroworks and Ecological Specialist. SACNASP registered (Pr.Sci.Nat. 400328/11).	Elbi Bredenkamp		1/09/2021
External Reviewer	Director: Cape Ecological Services. Extra-ordinary Professor, Stellenbosch University.	Prof. Patricia Holmes		30/08/2021

This report has been prepared in accordance with Enviroworks Quality Management System.

1.2. Disclaimer

Even though every care is taken to ensure the accuracy of this report, environmental assessment studies are limited in scope, time and budget. Discussions are to some extent made on reasonable and informed assumptions built on bona fide information sources, as well as deductive reasoning. Since environmental impact studies deal with dynamic natural systems additional information may come to light at a later stage during the impact assessment phase. The author does not accept responsibility for conclusions made in good faith based on own databases or on the information provided. Although the author exercised due care and diligence in rendering services and preparing documents, he accepts no liability, and the client, by receiving this document, indemnifies the author against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the authors and by the use of this document. This report should therefore be viewed and acted upon with these limitations in mind.

1.3. Revision record

Revision Number	Objective	Change	Date
1	Draft Report	Internal & Client Review	1/09/2021
2	Draft Report	External Peer Review	30/08/2021
3	Draft Report	Inclusion of measurable targets, status quo and rehabilitation plan update flow.	04/03/2022

2. SPECIALIST DETAILS

2.1. Details of the specialist

This Rehabilitation Plan was prepared and compiled by Megan Smith from Enviroworks. The sections below provide the details of the Specialist and explain their expertise to prepare this Plan.

Name:	Megan
Surname:	Smith
Highest qualification:	MSc Biological Sciences (UCT)
Botanical Society of southern Africa	No. 80495
IAIAsa membership	No. 6459
EAPASA registration	2020/2855
Postal address:	Enviroworks 1064 Private Bag x2 Century City 7446
Physical address:	Block B2 Edison Square, Ground floor c/o Century Avenue and Edison Way Century City 7441
Cell phone:	076 965 8002
E-mail:	Megan.smith@enviroworks.co.za

2.1.1. Expertise of the specialist

Megan Smith is an Ecological Specialist at Enviroworks. Her qualifications include a M.Sc. in Botany (UCT) and over 2 years' experience in the environmental field.

2.1.2. Statement of independence – specialist

I, Megan Smith, **ID 9412140124080,** declare that I-

- Am an Environmental Specialist at Enviroworks.
- Act as an independent Environmental Consultant.
- Have compiled this Rehabilitation Plan for the northern and southern strandline mining areas at Tormin Mine.
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference.
- Remuneration for services by the Proponent in relation to this proposal is not linked to approval by decision-making Authorities responsible for permitting this proposal.
- The consultancy has no interest in secondary or downstream developments because of the outcome of this Rehabilitation Plan.
- Have no and will not engage in conflicting interests in the undertaking of the Activity.
- Will provide the Client with access to all information at my disposal, regarding this project, whether favourable or not.

Signature:

Megan Smith

2.2. Details of the review specialist

This Rehabilitation Plan was reviewed by Elana Mostert from Enviroworks. The sections below provide the details of the Review Specialist and explain their expertise to reviewed this Plan.

Business name of Specialist:	Enviroworks
Specialist Name:	Elana Mostert
IAIAsa registered:	No. 5631
Botanical Society of South Africa:	No. 79489
Physical address:	Block B2, Edison Square, c/o Century Avenue and Edison Way, Century City, Western Cape
Postal address:	Suite 1064 Private Bag X2, Century City
Postal code:	7446
Telephone:	021 527 7051
E-mail:	elana@enviroworks.co.za
Fax:	086 601 7507

2.2.1. Expertise of the Review specialist

Elana Mostert is an Ecological Specialist at Enviroworks. Her qualifications include a M.Sc. in Botany (SU) and over 5 years' experience in the environmental field.

2.2.2. Statement of independence – review specialist

I, Elana Mostert, **ID 9105230099085,** declare that I-

- am an Environmental Specialist at Enviroworks.
- Act as an independent Environmental Consultant.
- Have reveiwed this Rehabilitation Plan for the northern and southern strandline mining areas at Tormin Mine.
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference.
- Remuneration for services by the Proponent in relation to this proposal is not linked to approval by decision-making Authorities responsible for permitting this proposal.

- The consultancy has no interest in secondary or downstream developments because of the outcome of this Rehabilitation Plan.
- Have no and will not engage in conflicting interests in the undertaking of the Activity.
- Will provide the Client with access to all information at my disposal, regarding this project, whether favourable or not.

Signature:

Elana Mostert

2.3. Details of the review specialist

This Rehabilitation Plan was internally reviewed by Elbi Bredenkamp from Enviroworks. The sections below provide the details of the Specialist and explain their expertise to reveiwed this Rehabilitation Plan.

Business name of Specialist:	Enviroworks
Specialist Name:	Elbi Bredenkamp
SACNASP No.	400328/11
Physical address:	Block B2, Edison Square, c/o Century Avenue and Edison Way, Century City, Western Cape
Postal address:	Suite 1064 Private Bag X2, Century City
Postal code:	7446
Telephone:	021 527 7084
E-mail:	elbi@enviroworks.co.za
Fax:	086 601 7507

2.3.1. Expertise of the review specialist

Elbi Bredenkamp is an Environmental Specialist and Director of Enviroworks. Her qualifications include a M.Sc. in Botany (UFS) and over 20 years' experience in the environmental field.

2.3.2. Statement of independence – specialist

- I, Elbi Bredenkamp, **ID 640213 0036 082,** am an Environmental Specialist at Enviroworks.
- Act as an independent Environmental Consultant.
- Have reviewed this Rehabilitation Plan for the northern and southern strandline mining areas at Tormin Mine.
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference.

- Remuneration for services by the Proponent in relation to this proposal is not linked to approval by decision-making Authorities responsible for permitting this proposal.
- The consultancy has no interest in secondary or downstream developments because of the outcome of this Rehabilitation Plan.
- Have no and will not engage in conflicting interests in the undertaking of the Activity.
- Will provide the Client with access to all information at my disposal, regarding this project, whether favourable or not.

Signature:

Elbi Bredenkamp

3. INTRODUCTION

Mineral Sands Resources (Pty) Ltd (MSR) have appointed Enviroworks (Pty) Ltd (suitably qualified rehabilitation specialists) to compile a rehabilitation plan for the Northern and Southern Inland Strand areas on Tormin Mineral Sands Operation (Tormin Mine). This detailed plan is compiled as per the request from MSR to ensure that clear rehabilitation targets and an implementation plan are compiled based on the high-level plan presented by Todd (2018) for the mine. This plan has been compiled to also ensure MSR's legislative compliance in terms of the National Environmental Management Act (NEMA) (Act 107 of 1998), National Environmental Management: Biodiversity Act (NEMBA) (Act 10 of 2004) and Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA).

This rehabilitation plan includes detailed steps to ensure that areas disturbed during mining activities (within the inland strandlines) on Tormin Mine are properly rehabilitated and to rescue and conserve plant species of conservation concern. This means that areas are to be rehabilitated with a plant cover (80% of reference sites' background perennial plant cover) that reduces the risk of erosion, control dust generation from wind, as well as restore some ecosystem functioning to be self-sustainable. This self-sustaining Strandveld vegetation cover is to finally restore the land capability of the area so that it can be utilised for sheep grazing post-mine closure (45ha/large stock unit is used as the baseline target given that this is what was recorded for the area in 2018)[1]. This rehabilitation plan is directly related to the site's Rehabilitation Strategic document (Appendix C) as outlined in Todd (2018) and the site's Rehabilitation Standard Operating Procedure (2021) (Appendix A). This plan is meant to be read as a working document that is expected to be updated on a yearly basis. See Appendix H for a flow diagram on how the plan will be updated.

3.1. Status quo of mining works once Enviroworks were appointed.

Enviroworks were appointed to compile the rehabilitation implementation plan in June 2021. Once Enviroworks were appointed, a site inspection (9 June 2021) was conducted to determine what mining (specific to the inland strandlines) and rehabilitation works were completed. Mineral Sands Resources had already excavated TWID 101-108 in the southern strandline of the mining area and the offices and laydown areas had already been established. Topsoil was removed with plants to a depth of approximately 30 cm and stored in a designated stockpile area (see Appendix G). A botanical survey (of the entire northern and southern inland strandline mining area and infrastructure expansion area) was also conducted in July 2020 (prior to any mining or excavations of the mining areas) to record the locations of any threatened or protected plant species. MSR has also constructed a nursery by June 2021 and some plants were stored in the nursery. Currently, the nursery is not actively being used due to personnel constraints but will be employed as part of the rehabilitation efforts. The use of the nursery will be included in a standard operating procedure (to be compiled with the quarterly progress reports).

[1] Department of Agriculture Forestry and Fisheries, "Grazing Capacity," 2018.

4. LEGISLATIVE REQUIREMENTS AND REGULATORY DOCUMENTS

South Africa has a suite of environmental related legislation. The NEMBA (Act 107 of 1988) and NEMA (Act 107 of 1998) provide the overarching legislative framework for regulating environmental impacts. However, the legislation has been constituted in such a manner that mining activities are authorised and regulated by the Department of Mineral Resources in terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002) (MPRDA). Section 37 of the MPRDA, states that:

(1) The principles set out in section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998)-

(a) apply to all prospecting and mining operations, as the case may be, and any matter or activity relating to such operation.

The NEMA (Act 107 of 1998) principles include:

(3) Development must be socially, environmentally and economically sustainable.

(4) (a) Sustainable development requires the consideration of all relevant factors including the following:

> *(i) That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;*
>
> *(ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;*
>
> *(viii) that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.*

The NEMA (Act 107 of 1998) further echoes the above by stating that(Section 24N):

(7) The holder and any person issued with an environmental authorisation—

(e) must, as far as is reasonably practicable, rehabilitate the environment affected by the prospecting or mining operations to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development.

Therefore, all owners of mining rights, mining permits, and prospecting must have a clearly laid out rehabilitation plan including any financial provisions that are required for rehabilitation. The financial provision for the rehabilitation works of the mine have been included and approved by the Department of Mineral Resources during the application of a Section 102 mining right.

There are several guideline documents which provide recommendations on how rehabilitation and closure should be undertaken. For the purpose of the plan the following guideline documents has been considered:

- Guidelines for the Rehabilitation of Mined Land. Chamber of Mine of South Africa/ Coaltech. November 2007;

- Best Practice Guidelines (BPGs) series developed by the Department of Water Affairs (DWA).

In addition to the abovementioned guideline documents further regulations were considered pertaining to closure and rehabilitation. These include:

- National Environmental Management Act (Act 107 of 1998);
- National Environmental Management: Biodiversity Act (Act 10 of 2004);
- Constitution of the Republic of South Africa (Act No.108 of 1996, Section 24);
- Conservation of Agriculture Resources Act, 1983 (Act No. 43 of 1983)
- National Water Act (Act 36 of 1998); and
- National Heritage Resources Act (Act 25 of 1999).

5. REHABILITATION OF DISTURBED AREAS AFTER STRIP MINING ALONG THE WEST COAST OF SOUTH AFRICA

Generally, once an area is mined, the ecology of the system is so disrupted that the native vegetation does not naturally re-establish, even decades after mining has ceased. This is particularly true for strip mining whereby the mining process causes total destruction of natural ecosystems through the removal of vegetation and soil in the area where mining is being undertaken.

During the mining process, soil substrate and the patch dynamic processes (which allow for resources to be concentrated in patches and support plants and other biota) that operate in it is significantly altered and removed. The mining process typically excavates 'overburden' soils from depths of up to 30 m or more and deposits these on the surface. These soils are sterile (have no animal or plant life or their propagules), are generally very low in the nutrients which support life and are often too saline to support most plant growth. Therefore, the strip-mining industry (particularly mineral mining) is considered one of the greatest threats to the biodiversity of the Namaqualand region [2] resulting in the need to restore areas that have been impacted by mining.

The ecosystems within the Namaqualand area/West Coast of South Africa, especially those within the Strandveld, are, however, particularly challenging to restore due to the unique floral diversity (double that than any other arid system)[3], strong prevailing winds, very low rainfall (50-150 mm per annum) and complex spatial and biological dynamics[4].

[2] L Mucina and M.C Rutherford, *The Vegetation of South Africa, Lesotho and Swaziland*, Strelizia 19 (Pretoria: South African National Biodiversity Institute, 2006).
[3] R.M. Cowling, K.J. Esler, and P.W. Rundel, "Namaqualand, South Africa – an Overview of a Unique Winter-Rainfall Desert Ecosystem," *Plant Ecology* 142, no. 1 (June 1, 1999): 3–21, https://doi.org/10.1023/A:1009831308074.
[4] Cowling, Esler, and Rundel.

Given the significant impact that strip mining has on the environment and the complex ecology of the vegetation found in the Namaqualand region, there are no standard guidelines on how to restore Namaqualand Strandveld. Nevertheless, research on the ecological and rehabilitation processes of the Namaqualand Strandveld vegetation have increased in the past two decades.

The general census is that proper topsoil management and replacement is crucial for rehabilitation[5] [6][7] . Proper topsoil removal and storage has been stressed on most mines along the West Coast of South Africa where topsoil (stripped to a depth of 50cm) is generally not recommended to be stored for longer than one month in stockpiles that have a height of one metre or below. Seeding and seedling translocation have also been used in rangeland rehabilitation trials in the Nama-Karoo biome and Succulent Karoo Biome[8] [9]including Tormin Mine's adjacent mine, Namakwa Sands at Brand se Baai.

Rehabilitation experiments, however, in the post-mining environment in the Namaqualand area were all unsuccessful in returning species richness, diversity and evenness to reference levels and creating a plant community similar to a reference site[10]. However, these methods are mostly successful in returning vegetation cover that can prevent erosion and dust pollution and returned land capability for small stock farming to the minimum prescribed grazing capacity (20 ha)[11]. Long term monitoring is required and a phased approach to rehabilitation has been suggested by Pauw *et.al* (2018) because some species clearly fail to establish in the adverse conditions at the onset of rehabilitation.

6. AIMS AND OBJECTIVES

6.1 Rehabilitation and restoration

According to the professional body, Society of Ecological Restoration (SER), rehabilitation refers to reinstating ecosystem functioning to renew ecosystem services potentially derived from a native ecosystem whereas

[5] Nancy Shackelford, Ben P. Miller, and Todd E. Erickson, "Restoration of Open-Cut Mining in Semi-Arid Systems: A Synthesis of Long-Term Monitoring Data and Implications for Management," *Land Degradation & Development* 29, no. 4 (2018): 994–1004, https://doi.org/10.1002/ldr.2746.
[6] A.J. Villiers et al., "The Restoration of Strandveld and Succulent Karoo Degraded by Mining: An Enumeration of Topsoil Seed Banks," *South African Journal of Botany* 70 (December 1, 2004): 717–25, https://doi.org/10.1016/S0254-6299(15)30171-X.
[7] Suzanne Milton, "Rethinking Ecological Rehabilitation in Arid and Winter Rainfall Regions of Southern Africa," *South African Journal of Science* 97 (January 1, 2001): 1–2.
[8] Kirsten Mahood, "STRIP MINING REHABILITATION BY TRANSLOCATION IN ARID COASTAL NAMAQUALAND, SOUTH AFRICA" (Masters Thesis, Stellenbosch University, 2003).
[9] JR Blood, "Monitoring Rehabilitation Success on Namakwa Sands Heaby Minerals Mining Operation, Namaqualand, South Africa." (Masters Thesis, Stellenbosch University, 2006).
[10] Marco J. Pauw, Karen J. Esler, and David C. Le Maitre, "Assessing the Success of Experimental Rehabilitation on a Coastal Mineral Sands Mine in Namaqualand, South Africa§," *African Journal of Range & Forage Science*, November 22, 2018, https://www.tandfonline.com/doi/abs/10.2989/10220119.2018.1526823.
[11] Pauw, Esler, and Maitre.

ecological restoration goes beyond this goal to reinstate ecosystem structure, functioning and composition[12]. The latest SER ecological restoration standards[13] provides a useful infographic of the 'Restorative Continuum' (please see the figure below) which illustrates these differences and also how rehabilitation and ecological restoration intergrade with one another.

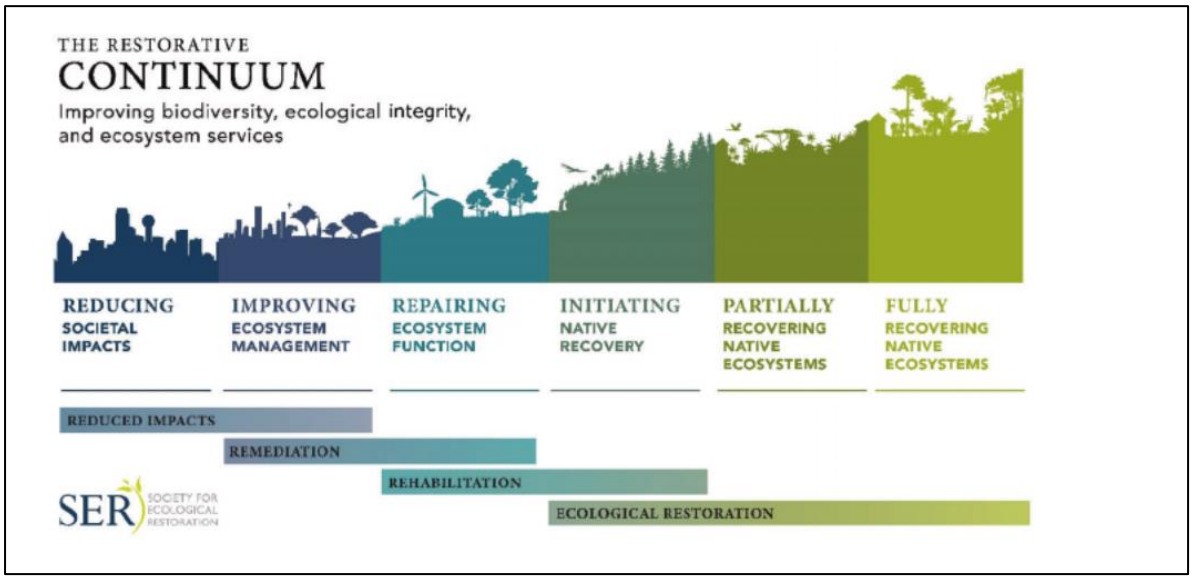


Figure 1 Restorative Continuum as visualised by the Society of Ecological Restoration[14].

Often post-mining landscapes provide highly modified edaphic conditions for which ecological restoration is an unattainable goal and rehabilitation is more realistic. In the case of sand strip mining, provided the overburden is not toxic and sufficient care is taken with the stripping and replacing of topsoil and upper subsoil, it may be possible over longer timescales to aim for ecological restoration. However, these goals can be impractical and thus, it would be more realistic focus on reinstating vegetation cover and structure to achieve ecosystem functioning. Therefore, for the purposes of this plan, the primary goal for post-mining environment at Tormin Mine will be focused on rehabilitation rather than restoration.

6.2 Rehabilitation goals

The overall aims of the rehabilitation plan are to provide suitable recommendation to implement rehabilitation guidelines/objectives and achieve rehabilitation goals, to provide suitable monitoring guidelines to ensure the long-term sustainability and determine the overall rehabilitation success of the rehabilitation works, and to establish potential sites for monitoring plots within the rehabilitation area and within the reference sites.

The rehabilitation goals/aims of the plan include the following:

[12] George D. Gann et al., "International Principles and Standards for the Practice of Ecological Restoration. Second Edition," *Restoration Ecology* 27, no. S1 (2019): S1–46, https://doi.org/10.1111/rec.13035.
[13] Gann et al.
[14] Gann et al.

- To prevent and manage certain environmental impacts, such as the loss of protected plant species, loss of sections of a Critical Biodiverse Area, and loss of ecosystem functioning throughout all the phases of the mine.
- To control the alien vegetation listed in the National Environmental Management Biodiversity Act (NEMBA), (Act 10 of 2004) Alien Invasive Species Regulations (2020).
- To rescue and conserve plant species of conservation concern (threatened or protected).
- To set up plots for monitoring purposes and to conduct experiments to determine when certain species should be introduced in the later stages of succession.
- For rehabilitated areas to host a natural, self-sustaining, indigenous vegetation cover and a species complement equivalent to that recorded prior to disturbance that has a grazing capacity of at least 45ha per large stock unit which is the grazing capacity of the farm recorded in 2018[15]. This means that around 10 sheep can graze on 45 hectares of land.

The above-mentioned rehabilitation objectives are to support the goals that the Society for Ecological Restoration (2002) have provided for a restored ecosystem:

- It should contain characteristic **species** that occur in the reference system.
- It should comprise largely of indigenous species.
- The functional groups necessary for continued stability must be present or have the potential to colonise.
- The physical environment must be conducive for the establishment of species that will lead to stability.
- It functions normally for its stage of development.
- It is integrated into a larger ecological matrix.
- Potential threats to the system's stability are eliminated.
- It is self-sustaining to the same degree as the reference system.

7. SITE DESCRIPTION AND LOCALITY

Situated ~360kms north of Cape Town on the West Coast of South Africa, Tormin Mine (Figure 2) consists of a number of high-grade placer beach and strandline mineral sands deposits hosting some of the richest grades in the world of naturally occurring zircon, ilmenite, rutile, magnetite and garnet.

Tormin's high-grade placer beach deposits are unique due to the rate that mining areas are naturally refurbished and the speed that the mineralisation actively replenishes. The Heavy Minerals ("HM") in the beach are regularly replaced by the transport of new sediments from deeper waters, much of which is derived from the erosion of

[15] Department of Agriculture Forestry and Fisheries, "Grazing Capacity."

deposits accumulated in the elevated historic beach terraces onto the present beach. This replenishment occurs as a result of the naturally highly dynamic nature of sediment transport processes on beaches in this area.

The Inland Strand (northern and southern) areas granted under the Section 102 Mining Right (WC 30/5/1/2/3/2/1(162 and 163 EM) (as per the Mineral Resources Act (Act 28 of 2002)) include two areas approximately 5.6 km in total length, covering 75 hectares of high-grade mineralisation adjacent to the existing mining operations on the MSR owned farm, Geelwal Karoo 262 (Figure 3). The Inland Strand is a palaeo-marine strandline 35 m above mean sea level in an area that has undergone historical exploration since the 1930s.

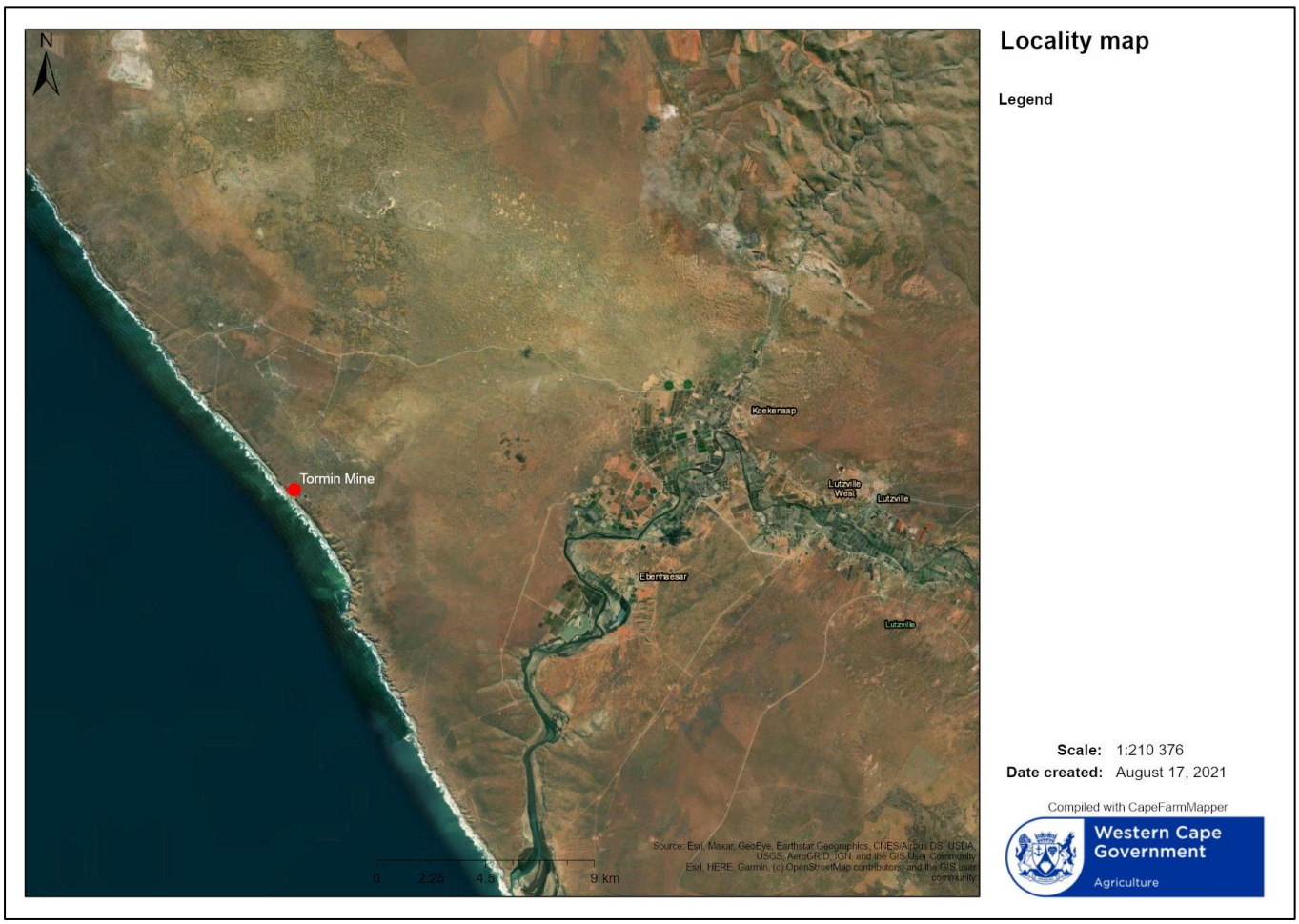


Figure 2 Locality of Tormin Mine

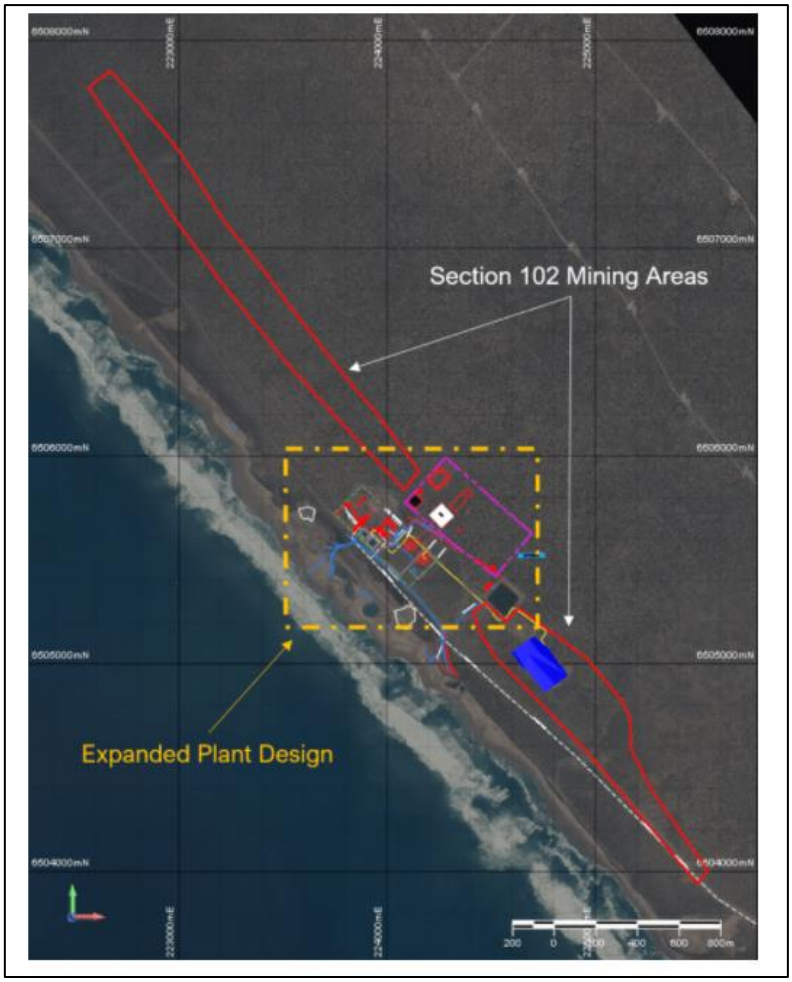


Figure 3 The locality and extent of approved Inland Strands on Tormin Mine (Red polygons labelled "Section 102 Mining Areas")

8. METHODOLOGY

This Rehabilitation Plan has been compiled based on a site visit conducted in July 2020 by Dr Stuart Hall, and four site inspections conducted by Enviroworks between May and July 2021. During the site visits, the length of the proposed footprint was driven, and sections of the northern and southern Inland Strands were traversed on foot. During the survey, the general ecological condition of the footprint and the direct surrounds were noted. A survey was done of threatened flora found within the footprint and direct surrounds. Pictures were taken of the site, surrounds and the species encountered on site for record purposes.

The rehabilitation plan was compiled in consultation with various literature sources including:

- Western Cape Spatial Biodiversity Plan (2017)[16].
- National Environmental Management: Biodiversity Act (NEMBA) (Act 10 of 2004).
- Nature Conservation Ordinance (No. 19 Of 1974).

[16] R Pool-Stanvliet, A Duffell-Canham, and R Smart, *The Western Cape Biodiversity Spatial Plan Handbook.* (Stellenbosch: CapeNature., 2017).

- NEMBA (Act 10 Of 2004): Publication of Lists of Critically Endangered, Endangered, Vulnerable and Protected Species.
- NEMBA (Act 10 Of 2004): Alien Invasive Species Lists (2020).
- Environmental Impact Assessment for Proposed Extension of Tormin Mine, West Coast, South Africa: Terrestrial Ecology Specialist Study (2018).
- Tormin Mine Amended Mining Work Program (2019)

Various Specialist Affidavits were also consulted. These affidavits were written as part of the application to suspend mining at Tormin Mine in terms of Section 26 of the MPRDA and were responses to the current Integrated Environmental Authorisation (WC30/5/1/2/3/2/1(162 and 163 EM)) that MSR hold for Tormin Mine. The affidavits consulted include:

- Expert Affidavit of Nick Helme[17]
- Expert Affidavit of Merle Rozanne Sowman[18]
- Expert Affidavit of Susan Brownlie[19]
- Expert Affidavit of Peter Carrick[20]

A condensed alien invasive vegetation plan was also compiled for Tormin Mine, based on the above-mentioned site visits.

9. VEGETATION AND SENSITIVITY DESCRIPTION

The Inland Strandlines on Farm Geelwal Karoo 262 are located within two vegetation types namely: Namaqualand Dune Strandveld and Namaqualand Heuweltjie Strandveld (Figure 4).

[17] Nick Helme, "Expert Affivdavit of Nick Helme" (Application for suspension in terms of Section 26 of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA), 2021).
[18] M.R Sowman, "Expert Affidavit of Merle Sowman" (Application for suspension in terms of Section 26 of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA), 2020).
[19] Susan Brownlie, "Expert Affivadit of Susan Brownlie" (Application for suspension in terms of Section 26 of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA), 2021).
[20] Peter Carrick, "Expert Affidavit of Peter Carrick" (Application for suspension in terms of Section 26 of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA), 2021).

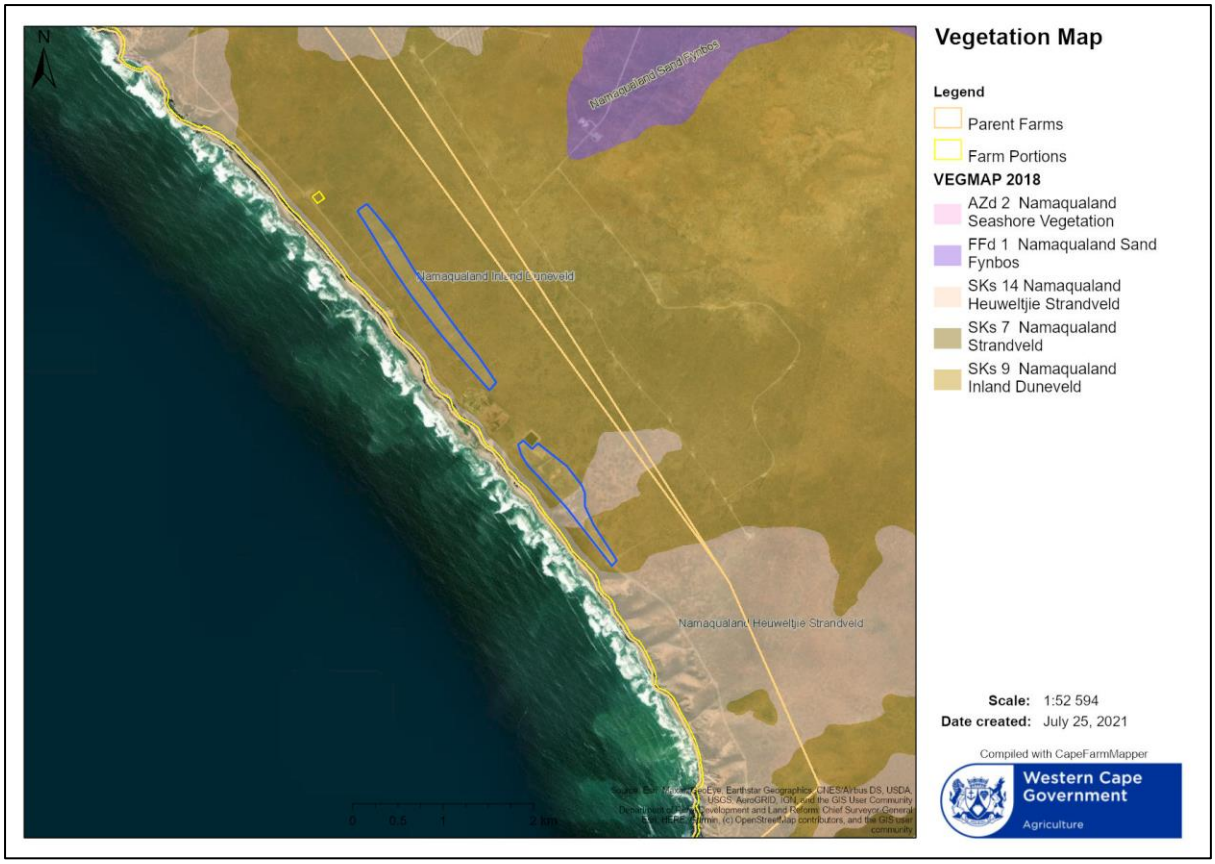


Figure 4 Vegetation types within the Inland Strandlines (blue polygons) on Farm Geelwal Karoo 262 as per the Western Cape Biodiversity Spatial Plan (2017).

Namaqualand Dune Strandveld occurs on peneplain with mobile sand dunes. The vegetation is characterised by tall shrubland dominated by non-succulent shrubs such as *Tetragonia* spp., *Lycium* spp., *Euclea* spp, *Searsia* spp, *Zygophyllum* spp., *Eriocephalus* spp., *Tripteris* spp and some grasses (such as *Ehrharta* spp.)[21]. According to Todd (2018), most of the area that is occupied by Namaqualand Dune Strandveld on Tormin Mine, is classified as "Moderately Tall Strandveld". Common and typical species associated with this area/habitat include *Stoeberia utilis, Zygophyllum morgsana, Othonna cylindrica, Pteronia onobromoides, Eriocephalus racemosus* var. *affinis, Exomis microphylla* var. *axyrioides, Tetragonia fruticosa, Senecio sarcoides, Ehrharta calycina, Asparagus capensis*, *Asparagus lignosus, Asparagus aethiopicus, Helichrysum hebelepis*, P*teronia divaricata, Lycium ferocissimum, Salvia africanalutea, Euphorbia burmannii, Galenia fruticosa, Conicosia pugioniformis* subsp *pugioniformis*, *Rushia* sp., *Leipoldtia schultzei, Mesembryanthemum crystallinum*, *Tripteris oppositifolia* and *Pelargonium gibbosum*. This community is widespread at the site and forms the majority of the affected area (Please see figure 5). Please note that a site inspection will be conducted before replanting works within the monitoring plants in the reference site (as described in Section 10) to determine an accurate detailed description (including plant cover and growth form diversity) for this vegetation type. However, goals for baseline perennial

[21] Mucina and Rutherford, *The Vegetation of South Africa, Lesotho and Swaziland*.

plant cover and diversity will be based on the site inspections conducted in 2021, Eccles *et.al* (1999), and Todd (2018) as detailed in Table 1.

Figure 5 Moderately Tall Strandveld typical of the Namaqualand Dune Strandveld section of the Geelwal Karoo 262 site[22].

Namaqualand Dune Strandveld is classified as a Least Threatened vegetation type on nationally[23], with a conservation target of 26% of its total original extent, and about 10% of its total extent has been transformed[24]. Relatively little was formally conserved until recently, although the Namaqua National Park does now include significant areas of this vegetation type (>60 000ha, or >15% of the total original extent, being more than half of the conservation target of 26%).

Namaqualand Heuweltjie Strandveld occurs in the Northern Cape along the western foothills of the Namaqualand Escarpment. It characterised by undulating plains that lead up the escarpment, and soils are typically relatively rich and derived from underlying granite or gneiss[25]. The vegetation cover comprises a mosaic of low shrubland communities dominated by leaf-succulent shrubs that occur on slightly raised, rounded termite mounds or "heuweltjies"; ascribed to former activity of harvester termites (*Microhodotermes viator*).

At Tormin Mine, Todd (2018) described the area dominated by Namaqualand Huewetjie Strandveld as "Short Strandveld". Within the site, common and dominant species within this habitat type include *Othonna cylindrica,*

[22] Simon Todd, "Environmental Impact Assessment for Proposed Extension of Tormin Mine, West Coast, South Africa: Terrestrial Ecology Specialist Study," 2018.
[23] South African National Biodiversity Institute (SANBI), *National Biodiversity Assessment 2018: The Status of South Africa's Ecosystems and Biodiversity, Synthesis Report* (Pretoria: South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, 2019).
[24] South African National Biodiversity Institute (SANBI).
[25] Mucina and Rutherford, *The Vegetation of South Africa, Lesotho and Swaziland*.

Exomis microphylla var. *axyrioides, Tetragonia fruticosa, Asparagus capensis, Cephalophyllum framesii*, *Psilocaulon dinteri, Vanzijlia annulata, Galenia fruticosa, Phyllobolus spinuliferus, Rushia* sp., *Leipoldtia schultzei, Berkhaya fruticosa, Didelta carnosa* var *carnosa*, *Euphorbia caput-medusae, Tripteris oppositifolia, Hypertelis angrae-pequenae* and *Zygophyllum morgsana* (please see figure 6 below). The diversity of this plant community is quite high, but the only endemic species observed by Todd (2018) in this habitat within the site was *Hermannia* sp. *nov*. (*bungholensis*), which also present in the other strandveld communities of the site. Please note that a site inspection will be conducted before replanting works within the monitoring plants in the reference site (as described in Section 10) to determine an accurate detailed description (including plant cover and growth form diversity) for this vegetation type. However, goals for baseline perennial plant cover and diversity will be based on the site inspections conducted in 2021, Eccles *et.al* (1999), and Todd (2018) as detailed in Table 1.

Figure 6 Short Strandveld typical of the southern section of the Geelwal Karoo 262 site, associated with fine-textured soils with occasional heuweltjies[26].

Namaqualand Huewetjie Strandveld is classified as Least Threatened nationally[27], with a conservation target of 28% of its original extent. Approximately 11% has been statutorily conserved (mostly in the Namaqua National Park) and 3-4% has been transformed by cultivation[28].

Table 1 Baseline data on perennial plant cover and diversity based on 2021 site inspections, Eccles et.al. (1999) and Todd (2018).

Vegetation type	**Perennial Plant Cover in 10x10 m plot**	**Plant diversity in a12.5 x 25m plot**

[26] Todd, "Environmental Impact Assessment for Proposed Extension of Tormin Mine, West Coast, South Africa: Terrestrial Ecology Specialist Study."
[27] South African National Biodiversity Institute (SANBI), *National Biodiversity Assessment 2018: The Status of South Africa's Ecosystems and Biodiversity, Synthesis Report*.
[28] South African National Biodiversity Institute (SANBI).

Namaqualand Huewetjie Strandveld	Approximately 40%	Approximately 36 species
Namaqualand Dune Strandveld	Approximately 60%	Approximately 40 species

In terms of sensitivity, the northern and southern Inland Strandlines are classified as Category 1 and 2 Terrestrial Critical Biodiverse Areas (CBAs)[29] (Figure 7).

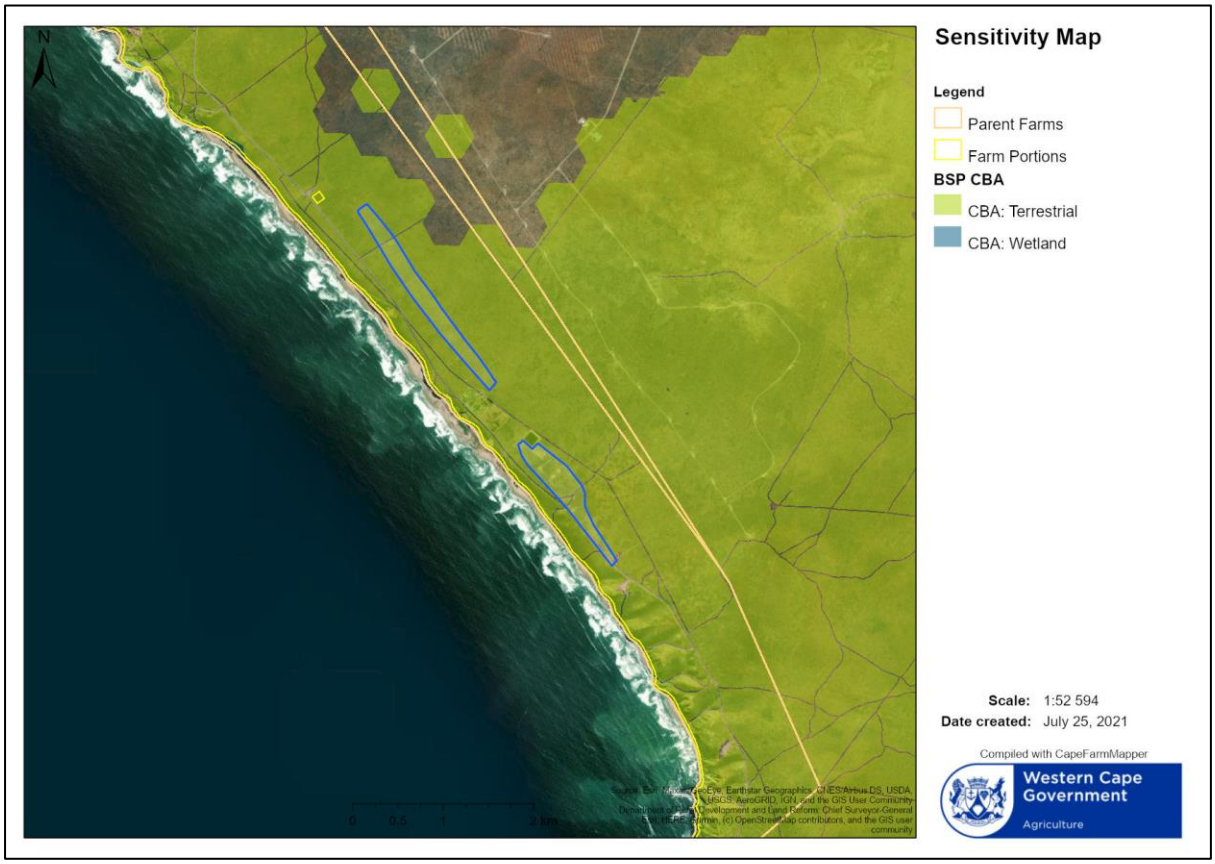


Figure 7 Areas of Conservation Sensitivity within the Inland Strandlines (blue polygons) on Farm Geelwal Karoo 262 as per the Western Cape Biodiversity Spatial Plan (2017).

CBAs are areas of high biodiversity and ecological value. These areas are required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure. CBAs that are likely to be in a natural condition are classified as Category 1 CBAs and those that are potentially degraded or represent secondary vegetation are classified as Category 2 CBAs[30] . Both Category 1 and 2 CBAs should be maintained in a natural or near-natural state, with no further loss of natural habitat and degraded areas should be rehabilitated.

[29] Pool-Stanvliet, Duffell-Canham, and Smart, *The Western Cape Biodiversity Spatial Plan Handbook.*
[30] Pool-Stanvliet, Duffell-Canham, and Smart.

10. REHABILITATION PHASE TIMEFRAMES AND RESPONSIBILITIES

The table below summarises the plan to be followed for the rehabilitation of the disturbed sites within the Northern and Southern strandline mining areas. The plan lays out the relative actions to be taken in a step-by-step process to achieve revegetation and rehabilitation goals and objectives.

Table 2 A general timeframe of rehabilitation efforts of the disturbed areas.

No.	Phase	Action	Reference Objective	Target	Responsibility	Timeframe	Range of suitable months
1	Pre-excavation	Search and rescue of threatened species including collection of seed/bulb/corm.	Rescue and conserve plant species of conservation concern (threatened or protected).	All identified threatened/protected species using Hall (2020) as a basis have been properly translocated as per Section 10.1 (1) i.e. before excavation of an area takes place.	MSR in consultation with rehabilitation specialists.	One month before excavation and before rain as per Section 2.6.	June – August for translocation
2	Pre-excavation	Seed collection of indigenous (but non-threatened and non-protected) species.	Prevent and manage certain environmental impacts, such as the loss of protected plant species, loss of sections of a Critical Biodiverse Area, and loss of ecosystem functioning throughout all the phases of the mine.	Seeds have been properly collected from indigenous species and stored as per Section 10.1 (2). Seeds are collected on a quarterly basis. At least 15 kg of seeds per 1,5 ha of expected disturbed area has been collected. Current expected area of disturbance is approximately 70 hectares.	MSR in consultation with rehabilitation specialists.	One month before excavation and during seeding times of the selected species.	Dependent on the species seeding time, but is expected to be March - July
3	Pre-excavation	Search and rescue of translocation/perennial species.	Prevent and manage certain environmental impacts, such as the loss of protected plant species, loss of sections of a Critical Biodiverse Area, and loss of ecosystem functioning throughout	Selected pioneer/fast growing perennial species have been successfully translocated to areas that show signs of erosion as per Section 10.1 (3). Initially 10 individuals per 10x 1 m	MSR in consultation with rehabilitation specialists.	One month before excavation and before rain.	June - August

No.	Phase	Action	Reference Objective	Target	Responsibility	Timeframe	Range of suitable months
			all the phases of the mine.	will be collected for translocation. However, long term quantitative targets for perennial species will be determined once the refence plots have been established and surveyed (to be established by June 2022).			
4	Excavation	Removal and storage of topsoil.	To prevent and manage certain environmental impacts, such as the loss of protected plant species, loss of sections of a Critical Biodiverse Area, and loss of ecosystem functioning throughout all the phases of the mine.	Topsoil is properly removed from mining areas (with plant material to a depth of 50 cm[31]) and managed (no alien plants present, stored at correct height (1 m) and preferably stored for one month or less)	MSR in consultation with rehabilitation specialists.	During Excavation (as per MSR's mining works program).	Throughout Mining activities during and after excavation.
5	Post-mining	Backfill of topsoil.	Prevent and manage certain environmental impacts, such as the loss of protected plant species, loss of sections of a Critical Biodiverse Area, and loss of ecosystem functioning throughout all the phases of the mine	Topsoil is properly backfilled and profiled within one month of excavation and placed back from where it was excavated from.	MSR	One month after excavation.	Throughout Mining activities after excavation

[31] Todd, "Environmental Impact Assessment for Proposed Extension of Tormin Mine, West Coast, South Africa: Terrestrial Ecology Specialist Study."

No.	Phase	Action	Reference Objective	Target	Responsibility	Timeframe	Range of suitable months
6	Post-mining	Erosion and Sand movement control.	Prevent and manage certain environmental impacts, such as the loss of protected plant species, loss of sections of a Critical Biodiverse Area, and loss of ecosystem functioning throughout all the phases of the mine	Shade cloth netting have been placed perpendicular to the dominant wind direction (6 m apart) across the entire disturbed area. Maintenance and monitoring of shade cloth is occurring at least quarterly.	MSR	Within one month of topsoil backfilling and profiling.	Throughout Mining activities after backfilling of topsoil
7	Post-mining	Replanting and reseeding indigenous species.	Prevent and manage certain environmental impacts, such as the loss of protected plant species, loss of sections of a Critical Biodiverse Area, and loss of ecosystem functioning throughout all the phases of the mine	Fast establishing pioneer (as per Section 10.3 (8)) species are planted in clumps 1-2 metres apart at each pole. All seeds have been sowed evenly across the topsoil in seed shelters (as per Section 10.1 (8)).	MSR in consultation with rehabilitation specialists.	Within one month of establishing the shade cloth netting.	Preferably between June and August.
8	Monitoring	Monitoring of rehabilitation implementation	• Set up plots for monitoring purposes. • Rehabilitated areas to host a natural, self-sustaining, indigenous vegetation cover and a species complement equivalent to that recorded prior to disturbance that has	80% of the background perennial plant cover (using the baseline data described in Section 9) and 50% of the plant diversity of the reference site have been established within 5 years (See Table 1 for specific targets). 45ha/Large Stock Unit grazing capacity must be established [33]. This means	MSR in consultation with a rehabilitation specialist/Botanist.	Year 1: 20% cover and 5 % richness Year 2: 40% cover and 10 % richness Year 3: 60% cover and 20% richness Year4: 70%. Cover and 30% richness	Monitoring to occur every four months for at least the first year post replanting and reseeding. Monitoring should be done in each season of the year (e.g., January, April, July, September)

[33] Department of Agriculture Forestry and Fisheries, “Grazing Capacity.”

No.	Phase	Action	Reference Objective	Target	Responsibility	Timeframe	Range of suitable months
			a grazing capacity of at least 45ha per large stock unit which is the grazing capacity of the farm recorded in 2018[32]. This means that around 10 sheep can graze on 45 hectares of land.	that around 10 sheep can graze on 45 hectares of land. Other indicators included in Section 10.4 must be similar/the same to reference sites.		Year 5: 80% cover and 50% richness. Indicators included in Section 10 must be similar/the same to reference sites increasingly each year.	
9	Excavation, Post-mining, and Monitoring	Alien Invasive Species Removal and Control.	To control the alien vegetation listed in the National Environmental Management Biodiversity Act (NEMBA), (Act 10 of 2004) Alien Invasive Species Regulations (2020).	All alien invasive species have been removed from Farm Geelwal Karoo 262 within 10 years. Each year, at least 10% of alien invasive species densities must be reduced.	MSR in consultation with Botanical Specialist.	During excavation, post-mining, and monitoring phases (where needed).	Throughout the mining activities and post-mining. It is expected for alien clearing to be conducted opportunistically and regularly every 4 months in each season of the year.

[32] Department of Agriculture Forestry and Fisheries, "Grazing Capacity."

Please see below a visual representation of an ideal rehabilitation implementation timeline/sequence for a one-year period. Table 3 should be used a guideline and can be updated where necessary.

Table 3 Visual representation of an ideal rehabilitation implementation timeline/sequence for a one-year period.

Item	Month											
	Month 1	**Month 2**	**Month 3**	**Month 4**	**Month 5**	**Month 6**	**Month 7**	**Month 8**	**Month 9**	**Month 10**	**Month 11**	**Month 12**
Search and rescue of threatened species including collection of seed/bulb/corm.												
Seed collection of indigenous (but non-threatened and non-protected) species.												
Search and rescue of translocation/perennial species.												
Removal and storage of topsoil.												
Backfill of topsoil.												
Erosion and Sand movement control.												
Replanting and reseeding indigenous species.												
Monitoring of rehabilitation methods.												
Alien Invasive Species Removal and Control.												

10.1 Pre-excavation phase

1. Search and rescue of threatened species

Before any excavation takes place, the localities of threatened or protected species (as per the NEMA Biodiversity Act) need to be identified by a suitably qualified and experienced botanist or rehabilitation specialist (using the species identified by Stuart Hall during the July 2020 site inspection, listed in Table 2 as a baseline). Ideally the botanical survey should be conducted between July and September when many of the species in the area are flowering. These localities must be recorded during early July to September when most of the species are flowering[34].

Identified species should be marked with a distinguishable flag or pole. This will aid to locate identified threatened or protected species for removal, translocation, or seed collection. Geophytic and succulent species are the most likely to survive translocation and should be targeted for translocation. Marked threatened or protected geophytic/succulent species should be removed and translocated to an area on the Farm Geelwal Karoo 262 that will not be mined or developed for infrastructure by suitably qualified rehabilitation/transplantation specialists. Two suitable locations have been identified at the locations shown in Figure 8 below.

[34] Helme, "Expert Affivdavit of Nick Helme."

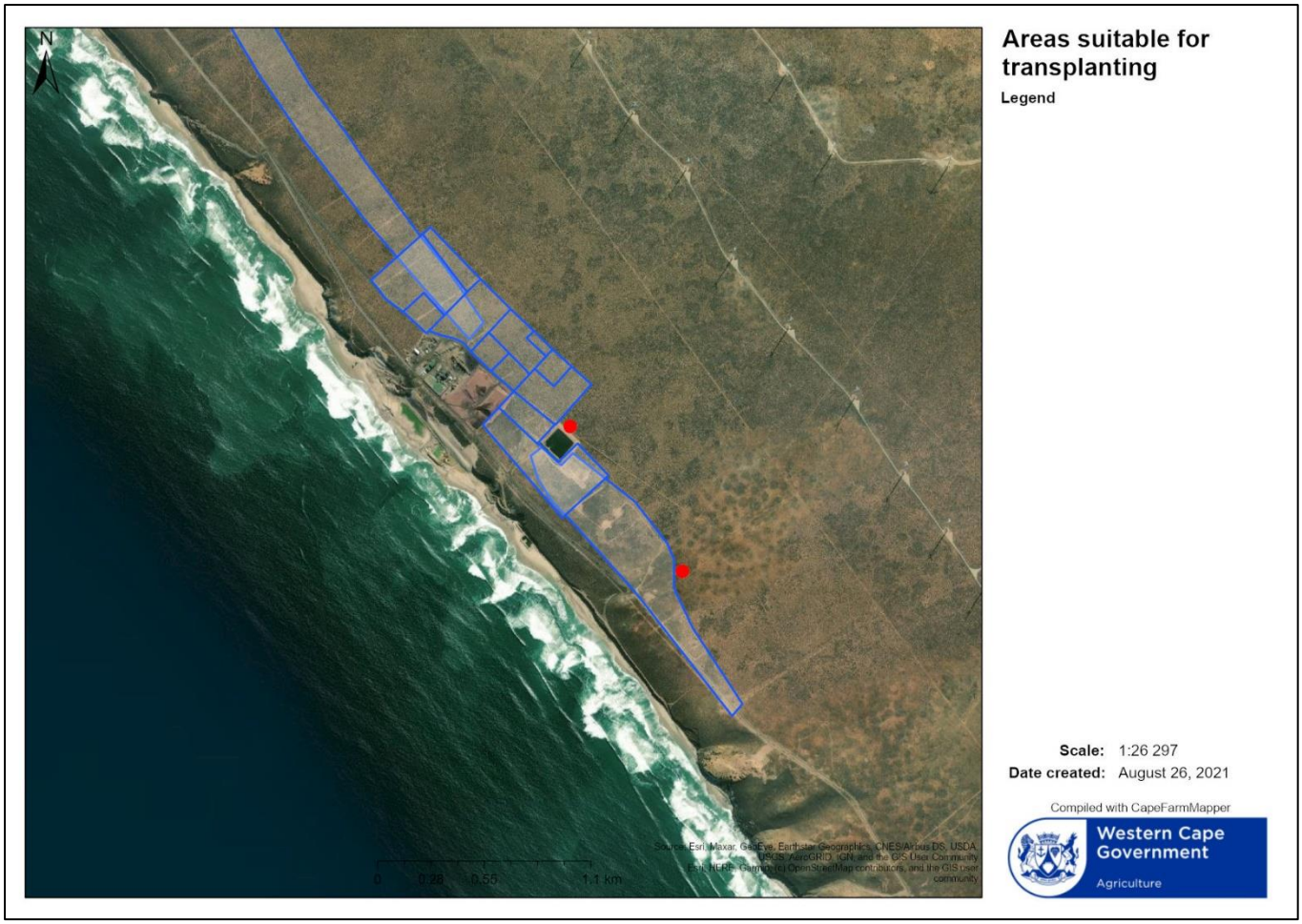


Figure 8 Areas (in red) on Geelwal Karoo 262 that are suitable for transplanting protected or threatened species. Blue polygons include areas that have been approved for mining or infrastructure development.

If species are not going to be removed and translocated immediately after identification, a GPS coordinate needs to be taken using a handheld GPS. The coordinate should be recorded on a data sheet as per the rehabilitation Standard Operating Procedure (Appendix A).

Should the identified species not be translocated immediately after they are removed, it is recommended the induvial be collected once the leaves have died back. The bulb can then be stored dry (in a dark storage area) at Katdoring Grond Rehabilitasie's (KGR) nursery for up to one year. The bulbs can then be planted into the areas that require rehabilitation in April – July.

Translocation operations must be completed before rain or during the rainy season (June – August) to ensure that the individuals establish in the new locations. Manual watering of the translocated species can be done but is not a requirement should there be rain events within 7 days apart from one another. For larger shrubs that will likely not survive translocation, it is recommended that seed from these species be collected instead.

Given that survival may be low for translocated threatened species due to competition, it is recommended that seed also be collected from all the species as a back-up propagation method. Seed collection (to be done by suitably qualified and/or experienced rehabilitation specialists) for threatened/ protected species must be done

during the species' seeding time as listed in Table 4 and be conducted as per the methods listed in Section 10 (2). Once collected, seeds must be stored according to Section 10 (2). These seeds can then be sowed from where they were collected from in the post-mining phase once the topsoil has been replaced and 20% vegetation has established.

Table 4 Species identified in the mining areas by Stuart Hall during the July 2020 site inspection.

Species name	Family	Redlist status[35] or Status as per the NECO (Act. 19 Of 1974) and NEMBA, 2004 (Act 10 Of 2004): Publication of Lists of Critically Endangered, Endangered, Vulnerable and Protected Species	Growth form	Seeding time
Lapeirousia simulans	IRIDACEAE	Vulnerable B1ab(ii,iii,iv,v)	Geophyte	February-March
Lachenalia barkeriana	HYACINTHACEAE	Near Threatened B1ab(iii,v)	Geophyte	November-December
Brunsvigia orientalis	AMARYLLIDACEAE	Protected as per Nature and Environmental Conservation Ordinance (Act. 19 Of 1974)	Geophyte	October - December
Babiana hirsuta	IRIDACEAE	Near Threatened B1ab(ii,iii,iv,v)	Geophyte	March - June
Helichrysum tricostatum	ASTERACEAE	Near Threatened B1ab(i,ii,iii,iv,v)	Shrub	March - June
Ferraria foliosa	IRIDACEAE	Near Threatened B1ab(ii,iii,iv,v)	Geophyte	January - March
Gethyllis verticillata	AMARYLLIDACEAE	Protected as per Nature and Environmental Conservation Ordinance (Act. 19 Of 1974)	Geophyte	June – July
Ferraria ferrariola	IRIDACEAE	Protected as per Nature and Environmental Conservation Ordinance (Act. 19 Of 1974)	Geophyte	January - March
Boophone haemanthoides	AMARYLLIDACEAE	Protected as per Nature and Environmental Conservation Ordinance (Act. 19 Of 1974)	Geophyte	March - June

2. Seed Collection of Indigenous (But Non-Protected or Non-Threatened) Species

There is a good understanding that removing and preserving the topsoil in the pre-excavation phase of a mine aids in the successful revegetation of West Coast/Coastal Namaqualand within the post-mining phase (refer to methods for removal and storage of topsoil in Section 10 (4)). However, only using the topsoil as a method for rehabilitation success is not effective. This is because only approximately 50% of the plant diversity of the standing vegetation in West Coast/Coastal Namaqualand areas are represented in the seed bank. Given the aforementioned, it is imperative to supplement the current seedbank with collected seeds and translocated whole plants (covered in Section 10 (8)) to ensure that similar plant cover and potential diversity to reference sites can be met.

[35] "The IUCN Red List of Threatened Species," n.d., https://www.iucnredlist.org/.

During search and rescue operations, seed collection of indigenous perennial (but non-protected or non-threatened) species must be conducted and facilitated by the Botanical Specialist. Areas of seed collection can include either the areas of excavation or the sites immediately adjacent on the Farm Geelwal Karoo 262 [36]. These seeds must be stored in separate seed bags (these are usually made from permeable material) and information including the species, collector name, date and location of seed collection must be recorded on the bag. Collected seeds must be handed over to the external service provider to be dried and stored according to their internal procedures.

During the post mining phase (and once the topsoil has been backfilled, profiled and the erosion prevention measures have been established), seeds must be sown back into areas that require rehabilitation to encourage pre-mining plant diversity/cover levels (as per Section 10 (8)). Seeding should be done manually via the method proposed in Section 10 (8). Given the strong winds in the area, seeds are recommended to be sowed before rain events and not during times when high winds are present.

In West Coast/Coastal Namaqualand areas, there is a tendency for annuals to provide the majority of seeds in the seed bank while perennials often do not exhibit long-term seed dormancy. The seedbank is thus dominated by short-lived species while the standing vegetation is dominated by perennial species. Furthermore, seed dispersal for perennial species in the West Coast/Coastal Namaqualand are typically short. This further contributes to the difficulties in re-establishing perennial species in post-mining area of the West Coast/Coastal Namaqualand region. Given that it is mostly perennial species that are missing from the seedbank, various perennial species found on Farm Geelwal Karoo 262 have been identified to be suitable for seeding. These species are as follows:

- *Ehrharta calycina*
- *Zygophyllum* spp.
- *Lebeckia sericea*
- *Ehrharta calycina,*
- *Salvia* spp.
- *Eriocephalus brevifolius*
- *Othonna cylindrica*
- *Tetragonia fruticosa*
- *Berkheya fruticosa*
- *Tripteris oppositifolia*
- *Drosanthemum hispidum*

Seeding time of the above-mentioned species are given below in Table 5.

[36] Antje Burke, "Practical Measures in Arid Land Restoration after Mining - a Review for the Southern Namib : Research in Action," *South African Journal of Science* 99, no. 9 (September 1, 2003): 413–17, https://doi.org/10.10520/EJC97697.

Asteraceae and Mesembryanthemaceae are the two largest families of plants in the lowland Namaqualand, and together dominate most communities in terms of composition and structure [37]. Therefore, seed collection from any species of the Asteraceae and Mesembryanthemaceae families can also be done. It is recommended that seed collection to be done not only during the seeding times presented in Table 5, but every four months throughout the duration of the mining works to ensure seed from as many species as possible have been collected.

Table 5 Seeding time of the species (non-threatened and non-protected) that are suitable for reseeding post-mining.

Species name	Family	Growth form	Seeding time
Ehrharta calycina	POACEAE	Herb	April -July
Zygophyllum spp.	ZYGOPHYLLACEAE	Shrub	March – July
Lebeckia sericea	FABACEAE	Herb	March-June
Salvia spp.	LAMIACEAE	Shrub	March-June
Eriocephalus brevifolius	ASTERACEAE	Shrub	April - June
Othonna cylindrica	ASTERACEAE	Shrub	December - February
Tetragonia fruticosa	AIZOACEAE	Succulent	March - June
Berkheya fruticosa	ASTERACEAE	Herb	December - February
Tripteris oppositifolia	ASTERACEAE	Shrub	December - February
Drosanthemum hispidum	AIZOACEAE	Succulent	December - February

3. Search and Rescue of other translocatable perennial species

Once topsoil has been replaced in the mined areas, perennial species that easily establish will be used to initially stabilise the soil and encourage growth of indigenous species (as per Section 10 (8)). Many suitable species that can used for rehabilitation purposes, are found on Farm Geelwal Karoo 262. Therefore, individuals of these species can be removed from areas that will be excavated and stored in a suitable location. These individuals can be used as part of the rehabilitation once the topsoil has been replaced in the mining areas. Please see the methodology below to achieve the aforementioned:

- Translocatable species (preferably perennials) must be uprooted and translocated to areas on Farm Geelwal Karoo 262 that particularly show signs of erosion as a mechanism for erosion control. Geophytic species' bulbs must be collected when the leaves have died back, and the bulb can be collected and stored in a dry, dark area in KGR's nursery. These bulbs can be stored for up to one year.

[37] Cowling, Esler, and Rundel, "Namaqualand, South Africa – an Overview of a Unique Winter-Rainfall Desert Ecosystem."

- Areas that show signs of erosion will be identified by the MSR Environmental Manager or appointed Rehabilitation Specialist and indicated to the translocation team during translocation.
- An area of current high importance for erosion control are the walls of the Processing Dam (31°33'15.1"S; 18°05'53.4"E).
- Succulent shrubs, geophytic and sprawling succulents are usually the best candidates for translocation, while most woody species are not suitable due to low survival rates[38].
- No alien species should be used for rehabilitation. Although some alien species are easy to establish, in the long run, they retard the return of the indigenous species and do not contribute to meeting rehabilitation goals.

The species selected for translocation (and are present at Farm Geelwal Karoo 262) are listed below based on Mahood (2003)[39] and Blood (2006)[40]:

i. *Othonna cylindrica*
ii. *Ruschia versicolor*
iii. *Lampranthus suavissimus*

Other species suitable for translocation (that are present at Farm Geelwal Karoo 262) include:

iv. *Mesembryanthemum crystallinum*
v. *Jordaaniella spongiosa*

The location of the above-mentioned species for translocation will be identified by the appointed rehabilitation specialist prior to translocation. The location of these species will be conveyed to the translocation team as part of their induction. Translocation should be done before rain or during the rainy season (June-August) to ensure that the individuals successfully establish. Information on the translocation species must be recorded according to the Rehabilitation Standard Operating Procedure in Appendix A. Manual watering of the individuals may be required should there be rain within seven consecutive days

[38] Mahood, "STRIP MINING REHABILITATION BY TRANSLOCATION IN ARID COASTAL NAMAQUALAND, SOUTH AFRICA."
[39] Mahood.
[40] Blood, "Monitoring Rehabilitation Success on Namakwa Sands Heaby Minerals Mining Operation, Namaqualand, South Africa."

10.2 Excavation Phase

4. Removal and storage of topsoil

A crucial part of the rehabilitation of the mined areas, is the removal and storage of topsoil. This is because key components such as soil nutrients, soil biota (including mycorrhizae), and soil seedbank are stored in the first 5-50cm of the soil (topsoil)[41]. Moreover, one of the main drivers of successful rehabilitation on the West Coast of South Africa is the provision for adequate storage of the topsoil. Should topsoil storage not be appropriate, there is a major risk that rehabilitation will be unsuccessful if no further interventions have been applied.

According to de Villiers et al (2004)[42], vegetation and topsoil (to a depth of 50 cm (15cm and then 35 cm)) must be simultaneously stripped by bulldozers and scrapers just before mining activities. Topsoil movement must not occur during rain events or when wet to avoid soil compaction and death of propagules. The two layers of topsoil should be stored separately to avoid dilution of the seedbank. The topsoil stockpiles must be placed in stockpiles in designated areas or - where mine sequencing allows - placed directly over tailings backfilled to the preceding mine void (refer to Section 10(5)) in the reverse sequence the topsoil was collected. This has the advantage of ensuring that vegetative material (including the seedbank) is returned to the same area from which it was removed.

It must be noted that areas topsoil collected from different vegetation types must be collected and stored separately to avoid any mixing of different soil properties. These soils must then be replaced in the areas from whether they were excavated.

Should an area not be immediately readied for topsoil replacement, topsoil must be stored in the existing topsoil storage area on Farm Geelwal Karoo 262. A major threat to topsoil storage on the West Coast of South Africa is the possibility of wind erosion. To circumvent this, stockpiles should not be higher than one metre (1m). It is also crucial that topsoil must be stored separately to the overburden or other soils to avoid mixing of soils. As best practise, topsoil should not be stored longer than **one** month to ensure the maximum viability of soil stored seeds[43][44]. Please note that a Topsoil Management Standard Operating Procedure has been compiled for Tormin Mine (Appendix D) and must be used to manage topsoil stockpiles.

During storage, topsoil must be monitored monthly by MSR's Environmental Manager or a suitably qualified Botanical Specialist for the emergence of alien invasive species. Should any of these species emerge in the topsoil stockpiles, these must be immediately mechanically removed and disposed of (as per Section 9 below) and the Alien Invasive Species Management Plan that must be compiled for Tormin Mine).

[41] Carrick, "Expert Affidavit of Peter Carrick."
[42] Villiers et al., "The Restoration of Strandveld and Succulent Karoo Degraded by Mining."
[43] Villiers et al.
[44] Paul Strohmayer, "Soil Stockpiling for Reclamation and Restoration Activities After Mining and Construction | Resolution Copper Project and Land Exchange Environmental Impact Statement," accessed August 23, 2021, https://www.resolutionmineeis.us/documents/strohmayer-1999.

Should the topsoil be stored longer than three months, the likelihood of decreased seed viability in the soil stored seed bank is high[45]. In this case, additional seed must either be collected or purchased from Katdoring Grond Rehabilitasie (KGR). Additional pioneer plants may need to be translocation form either an existing area on Farm Geelwal Karoo 262 or from KGR's nursery. Please see Appendix D for a Topsoil Management Standard Operating Procedure that must be following in this case.

10.3. Post-mining

5. Backfill of topsoil

As mentioned in the previous section, because the seeds and microbes in the topsoil decline over time, it is recommended that the topsoil is used as quickly as possible and should preferably be transferred directly from where it is being stripped to where it is being applied.

It is recommended that once an area has been mined, the tailings are immediately deposited and dried. Once the tailings have dried, the overburden and upper soil layers can be backfilled in the reverse order that they were excavated (as per the mining works program for Tormin Mine in Appendix B).

Given the nature of the mining works at Tormin Mine, it is recommended that areas be excavated while the adjacent areas are then backfilled with the excavated material (please see an example in Figure 6 below). This is a common method applied to mineral mining on the South African West Coast, including at a similar mining site Brand se Baai [46], and is also the most effective manner in ensure rehabilitation success[47]. This method ensures that that topsoil is used within one to three months of excavation resulting in less probability of reduced seed viability in the topsoil.

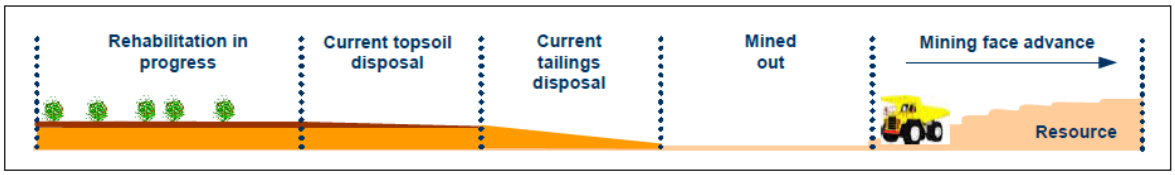


Figure 9 Example of how the mining and rehabilitation works is recommended to take place.

Once these layers have been backfilled, the topsoil layers should then be backfilled and profiled effectively to blend in with the surrounding landscapes (for example, no steep differences). Profiling and shaping the topsoil and below layers are an important aspect to ensuring rehabilitation success because it directly influences the

[45] Carrick, "Expert Affidavit of Peter Carrick."
[46] Blood, "Monitoring Rehabilitation Success on Namakwa Sands Heaby Minerals Mining Operation, Namaqualand, South Africa."
[47] Mahood, "STRIP MINING REHABILITATION BY TRANSLOCATION IN ARID COASTAL NAMAQUALAND, SOUTH AFRICA."

probability of erosion and thus, affects the successful establishment of transplanted plants. The final reshaping of the topsoil should be visually similar to that of the surrounding area [48].

7. Wind erosion and sand movement control

Areas that are being rehabilitated are especially vulnerable to wind erosion, firstly because there is no vegetation cover to protect the soils, and secondly, because the soils are loose from being disturbed. Sand movement results in sand accumulation leading to burial of established plants. Seedlings are especially vulnerable to burial by sand as they cannot grow fast enough to outpace the rate of burial. Alternatively, there may be sand erosion, leaving plant roots exposed. In both cases, sand movement leads to death and loss of the plants. This is usually remedied by placing shade cloth wind barriers perpendicular to the dominant wind direction.

A number of lace shade cloth wind barriers need to be placed perpendicular to the dominant wind direction on rehabilitation areas. These shade cloths need to be no further than six metres (6 m) apart [49](Figure 7) and placed firmly against the ground (i.e., No gaps at the base of the shade cloth must be visible). The wind barriers need to be maintained in place until such time as the vegetation cover has recovered sufficiently to stabilise the sand (approximately 30-40% vegetation cover) which usually occurs after 3 years if the Namakwa Sands are used as an example. As these areas remain vulnerable to disturbance for decades, rehabilitated areas should be demarcated as no-go areas and protected from disturbance (i.e., movement of vehicles and personnel, and excavation) as much as possible.

[48] Mahood.
[49] T.JF Halbich, "Mine Rehabilitation in the Arid Succulent Karoo Vegetation Zone on the South African West Coast, Namakwa Sands – Case Study," *Heavy Minerals Conference 2003: Current Challenges in Heavy Mineral Exploitation, 6–8 October, 2003, Cape Town, South Africa*, 2003.

Figure 10 Example of wind break netting that should be implemented after topsoil has been applied

Throughout the duration that the wind barriers are erected, the shade closes need to monitored monthly for maintenance. The barriers need to be monitored for any twists, gaps, or tears in the netting, or heaps of netting on the edge of the barrier. Should there be any fault in the netting as per the aforementioned, the fault must be rectified immediately as per the Standard Operation Procedure in Appendix E.

8. Replanting and reseeding indigenous species

Once the shade cloths have been implemented, it is recommended that the perennial species collected for translocation are placed in multispecies clumps at 1-2 m apart (at each of the shade cloth poles)[5051]. The transplants provide immediate cover and structure and encourage the establishment of other species through creating seed traps and suitable microsites for plant establishment, even if they do not survive. There is some debate as to whether transplants should be provided with supplementary water post-transplant or not, however some studies have shown that this does not significantly improve survival[52], and given the logistical problems with irrigating, it is not seen as a viable option for most situations along the West Coast.

Transplanting should preferably occur during the wet/rain season (June- August) when there is some moisture in the soil as this improves survival and it is also easier to work the soil when it is not too loose. Should the translocated individuals not provide enough plant material, additional perennial/translocatable species can be purchased from a local nursery, Katdoring Grond Rehabilitasie (KGR). These plants should be translocated as whole plants to ensure successful establishment. A list of suitable transplantable pioneer species is given in Section 10 (3).

During translocation, small berms must be manually created around the individual plants to assist in the capturing and retention of water (please see Figure below). Once the species have been planted, collected seed can be evenly spread across the topsoil in manually created shelters (i.e. cardboard boxes) as demonstrated through the work that the Nuture Restore Initiative (NRI) have conducted at neighbouring mines. Cardboard shelters (1x1m) should be implemented between shade cloths (two between each shade cloth)[53] and be planted between plant clumps. Please see an example of these seed shelters in figure 9 below. These boxes must be checked once a month to ensure that none of the boxes have collapsed since this will significantly affect seedling survival. Should not enough seed have been collected, additional seeds can be bought from KGR. Similarly, to translocations, sowing should be completed in the rainy season preferably immediately before a rain event.

[50] Mahood, "STRIP MINING REHABILITATION BY TRANSLOCATION IN ARID COASTAL NAMAQUALAND, SOUTH AFRICA."
[51] Blood, "Monitoring Rehabilitation Success on Namakwa Sands Heaby Minerals Mining Operation, Namaqualand, South Africa."
[52] Mahood, "STRIP MINING REHABILITATION BY TRANSLOCATION IN ARID COASTAL NAMAQUALAND, SOUTH AFRICA."
[53] Raldo Kruger, "UNTANGLING CLUMPS –FACTORS INFLUENCING SEEDLING ECOLOGY IN A SEMI-DESERT, AND THE IMPLICATIONS FOR RESTORATION ECOLOGY" (M.Sc Thesis, University of Cape Town, 2010).

Figure 11 Example of seed shelters[54].

Figure 12 Example of a berm around a plant[55].

[54] Kruger.

[55] "Watering Trees - LANDSCAPE LUSH," accessed August 26, 2021, https://ucanr.edu/sites/sjcoeh/Trees/Pruning/.

In terms of experiments; at least five 5 x 20 m plots are recommended to be placed within each vegetation type. The purpose of these plots will be to test experimental methods included the clump plantings and to determine the timing of the introduction of certain species[56] and to determine if any functional groups may be missing. Based on examples from Namakwa Sands, some functional groups (especially bulbs) may not regenerate and will need to be re-introduced actively. By using the monitoring plots, not only the missing functional groups can be determined, but also the survival of some the species introduced. These experiments will be used to update this post-mining section.

Reseeding of collected seed can be done once/while the above-mentioned clumps have been planted. Seeding should be done manually via seed broadcasting to ensure a large coverage of seeds. Given the strong winds in the area, seeds are recommended to be sowed before rain events and not during times when high winds are present. It is recommended that sowing of seeds be done once after the topsoil has been backfilled, and the plant clumps have been planted, and then once a year after that (after the respective seeds has been collected as per Section 10 (2)). This is to encourage maximum plant establishment and diversity.

10.4 Monitoring

9. Rehabilitation monitoring methods and timeframes

The primary purpose of monitoring should be to inform and enable adaptive management interventions and improve rehabilitation outcomes. As such, monitoring must be linked to targets, their associated measurement intervals as well as what actions are triggered when a target has not been met. There should thus be a clearly defined feedback between monitoring outcomes and consequent rehabilitation actions. Monitoring is recommended to be completed quarterly by a Botanical Specialist for the first year of rehabilitation after which bi-annual monitoring events (in Summer and Winter months) may take place by a Botanical Specialist.

Potential reference sites have been identified throughout Farm Geelwal Karoo 262. These reference sites are sites adjacent to the mining area and are generally undisturbed, natural, and represent the relevant indigenous vegetation types. It is expected that monitoring plots or transects to be marked in the reference sites for each vegetation type in the mining area. There must be equal number of monitoring transects or plots through the rehabilitation areas and reference sites.

A baseline description (plant cover and dominant species) of these references sites is included in Section 9. A detailed description of these areas is expected to be completed by a Botanical Specialist before monitoring occurs to refine any rehabilitation targets where necessary. This will be updated in this rehabilitation plan accordingly.

[56] Pauw, Esler, and Maitre, “Assessing the Success of Experimental Rehabilitation on a Coastal Mineral Sands Mine in Namaqualand, South Africa§.”

In terms of monitoring methods, effective rehabilitation monitoring at Namakwa Sands is done using least three transects and the point survey method in the rehabilitation site and the reference site[57] (within each vegetation type). The reference site is expected to be an area adjacent to the rehabilitation site that is undisturbed and not approved for mining or infrastructure development. Each transect is expected to have 4000 step points.[58].

The point survey method is recommended to use simple indicators such as plant cover (by measuring percentage cover across the transect) and species richness (number of species across the transect) because they are usually the most simple and reliable to measure during monitoring, especially to measure short-term recovery. However, it is recommended that additional indicators such as species composition, vegetation structure, species dominance, and functional diversity be used [59] to ensure that long-term recovery of the vegetation and ideal grazing capacity is achieved.

Baseline rehabilitation targets for plant cover that are required to be assessed on an annual basis is listed in Table 6. For plant richness, it is recommended that the rehabilitation works to be successful if 50% of the reference site in a 100 x 100m plot[60] . Baseline targets for species diversity are included in Table 6[61]. Please note that baseline perennial cover, perennial plant and growth form diversity in the reference sites will be accurately determined once the monitoring plots/ transect points have been established in the reference sites. This rehabilitation plan will be updated accordingly.

Table 6 Baseline data on perennial plant cover based on 2021 site inspections, Eccles et.al (1999) and Todd (2018).

Vegetation type	**Perennial Plant Cover in 10x10 m plot**	**Plant diversity in a12.5 x 25m plot**
Namaqualand Huewetjie Strandveld	Approximately 40%	Approximately 36 species
Namaqualand Dune Strandveld	Approximately 60%	Approximately 40 species

Another monitoring method that will be explored is Landscape Functional Analysis (LFA). LFA provides a rapid, reliable, and easily applied method for assessing and monitoring rehabilitation between various land units across the landscape. LFA examines the way physical and biological resources are acquired, used, cycled and lost from a landscape. These characteristics can be easily measured to provide indicators of different aspects of the

[57] Blood, "Monitoring Rehabilitation Success on Namakwa Sands Heaby Minerals Mining Operation, Namaqualand, South Africa."
[58] Blood.
[59] Blood.
[60] Villiers et al., "The Restoration of Strandveld and Succulent Karoo Degraded by Mining."
[61] N.S. Eccles, K.J. Esler, and R.M. Cowling, "Spatial Pattern Analysis in Namaqualand Desert Plant Communities: Evidence for General Positive Interactions," *Plant Ecology* 142, no. 1 (June 1, 1999): 71–85, https://doi.org/10.1023/A:1009857824912.

functioning of the overall system. It has been successfully used to mostly determine rehabilitation success in rangelands[62]s, but also recently to determine rehabilitation success post-mining [63] [64] [65]

LFA is based on assessment of specific landscape characteristics. On a broad scale, LFA assesses the location and size of vegetation "patches", where resources accumulate, and bare soil areas ("inter-patches"), where resources may be mobilised and lost. By measuring patches and inter-patches over time, the rate and extent of vegetation cover achieved by rehabilitation can be assessed, thus providing evidence of rehabilitation success. This information also gives an insight into whether the rehabilitation area is achieving self-sustainability (i.e. whether a landscape is developing in which minimal resources are lost due to stress or disturbance). This insight is possible because patches of vegetation tend to correlate to areas where natural resources accumulate, whilst inter-patches represent areas where resources are easily transported and therefore, potentially lost from the system. A landscape where resources are well retained and utilised is referred to as "functional", whilst one that loses resources is, to some extent, "dysfunctional". Detailed methods listed in Tongway and Hindley (2004) will be used as baseline for the LFA method that will be explored at Tormin Mine.

Establishment of plant species cover and grazing capacity as per Table 1 and other indicators, should increase in similarity to the reference sites annually. Should these indicators show that the desired rehabilitation is not being achieved, MSR (in consultation with a rehabilitation or botanical specialist) can adapt the rehabilitation and erosion control measures where necessary.

During monitoring events, it is also recommended that the presence of Alien Invasive Species be monitored and removed mechanically as soon as practically possible as per the following Section and Appendix E.

10. Alien invasive species management process

Mineral Sands Resources (MSR) is obliged in terms of section 76 of the National Environmental Management: Biodiversity Act (Act 10 of 2004, NEMBA) and the Alien and Invasive Species Regulations (AIS Regulations), 2020 (GN No. 1020 of 2020) (Department of Environment, Forestry, and Fisheries, 2020a) to control alien invasive vegetation on land under their control (i.e. Tormin Mine). An alien invasive species (AIS) management plan as

[62] Niels Dreber, Salmon Rooyen, and Klaus Kellner, "Relationship of Plant Diversity and Bush Cover in Rangelands of a Semi-Arid Kalahari Savannah, South Africa," *African Journal of Ecology* 56 (March 1, 2018): 132–35, https://doi.org/10.1111/aje.12425.
[63] David Tongway and N Hindley, "Landscape Function Analysis: Procedures for Monitoring and Assessing Landscapes - with Special Reference to Minesites and Rangelands," *CSIRO Sustainable Ecosystems*, January 1, 2004.
[64] A. R. Palmer et al., "Defining Function in Rangelands of the Peddie District, Eastern Cape, Using Landscape Function Analysis," *African Journal of Range and Forage Science* 18 (2001): 53–58.
[65] P. D. Erskine, A. T. Fletcher, and B. Seaborn, "Opportunities and Constraints of Functional Assessment of Mined Land Rehabilitation" (Mine Closure 2013: Eighth International Seminar on Mine Closure, 2013 18-20 September, Cornwall, Australian Centre for Geomechanics, September 18, 2013), https://doi.org/10.36487/ACG_rep/1352_28_Erskine.

per AIS Regulations (2020) has not been included here but has been included as Appendix E. The discussion below will form the basis of the AIS management plan which will be updated after every monitoring inspection.

Invasive alien plant species within the project site need to be controlled for the following reasons:

- They present a fire risk. The large available biomass provides a large fuel load that will easily ignite if lit in many cases. This not only poses a threat to nearby homesteads but could also result in unwanted wind erosion due to reduced vegetation cover, especially in areas with steep slopes.
- They threaten water security. Studies in South Africa have shown how alien invasive species notably reduce the country's water resources which has far reaching ecological, economic and social implications. For example, it is estimated that one large Eucalyptus tree uses between 100-1000 litres of water per day.
- They threaten biodiversity. AIS's threaten to displace indigenous vegetation and could result in local extinctions if not controlled. These species will also outcompete indigenous species that are used for rehabilitation of disturbed areas.

9.1 Classification and prioritisation of clearing Alien Invasive Plant Species

According to the Alien and Invasive Species Regulations (2020), landowners are obliged to eradicated category 1a and 1b species, and category 3 species within riparian areas. Landowners can apply for an Alien Invasive Species Permit to retain Category 2 species. Nevertheless, all NEMBA (Act 10 of 2004) listed species must still be controlled (i.e. their spread and propagation are prohibited). For this reason, it will be the most practical for MSR to clear all alien invasive species regardless of their NEMBA category. Only controlling the spread of certain species will be impractical for MSR and more resource intensive in the long term.

9.2 Types of control methods are used to control Alien Invasive Plant Species

Three main types of clearing methods exist for clearing alien invasive plant species:

- Mechanical Control: This is the physical removal or destruction of plants and includes techniques such as hand-pulling, felling, uprooting, ringbarking, cutting/slashing, strip barking or mowing. The type of mechanical control used will depend on the species, the level of infestation and the steepness of the slopes and accessibility on which the species occur.
- Chemical Control: This method uses herbicides (plant poison) to kill targeted plant species. It is important that the appropriate herbicide is selected for the species and purpose required as these poisons can often do more harm than good, especially when working near wetlands and water courses.
- Biological Control: This is the use of a species' natural enemies (biological control agents) to remove a plant's competitive advantage and thereby reduce population vigour. This method is usually only effective in the long term.

Removal of alien invasive species must be done mechanically. Unless otherwise specified, no herbicide may be used to manage the individuals given the biological sensitivity of the area.

9.3 A detailed list and description of any listed invasive species occurring on the relevant land

During the site inspections mentioned in Section 8, the alien invasive species identification, and age class were recorded. During these site inspections, only one Alien Invasive Management regulations (2020) listed species was recorded on the mining areas and infrastructure development areas. This detail of this species is included in Table 5. This list must be updated during the subsequent site visits by the botanical/rehabilitation specialists, where necessary, throughout the duration of the excavation and post-mining phases. Biomass must be removed from the Farm and disposed of at a registered landfill facility (Ceres solid waste and cleansing department is recommended).

Table 7 Alien Invasive Species recording on Farm Geelwal Karoo 262 and their respective control methods.

Species name	Family	Category	Description	Age Class	Control Method
Atriplex lindleyi ssp. *inflata*	AMARANTHACEAE	1b	Annual or short-lived perennial forb to 40cm tall or sprawling. Leaves 1-4cm long, 3-15mm wide, flat, mealy, margins toothed to entire. Flowers tiny (less than 3mm across), male and female flowers on the same plant. Male flowers in small globular groups or very short spikes at the tops of the stems, female flowers solitary or in clusters at the bases of the leaves.	Adult	Hand-pull

The species mentioned in Table 5 must be cleared throughout all the phases of the mine (as per Appendix E). Areas surrounding infrastructure, roads, and rehabilitated areas are recommended to be prioritised for clearing given that these areas will likely be the most vulnerable to invasion (as per Appendix E).

11. CONCLUSION

In terms of achieving good rehabilitation outcomes, the most important aspect of mining process management is the efficient management of topsoil. The mining process would need to ensure that complementary activities are happening simultaneously, such that topsoil does not need to be stored for extended periods and can preferably be transferred directly from one area to another.

In terms of the species most suitable for rehabilitation, these should be drawn from the local species pool. Succulent shrubs and sprawling succulents are usually the best candidates for translocation, while most woody species are not suitable due to low survival rates. Transplants are useful in that they provide instant cover and structure and do not require several years to establish. It is also recommended that supplementary seeding be done as previous research has found that it is the combination of seeding and transplants that result in the most successful rehabilitation.

The ultimate goal of the rehabilitation is twofold, firstly and primarily, it is to restore ecological function (and to ensure a suitable grazing area for sheep in the post-mining closure phase) and secondly, it is to remediate and improve the visual impact of the post-mining landscape. In terms of restoring ecological function, the main

metrics of success are vegetation cover and structure. While diversity is important in the long-term, in the short to medium term, diversity is of secondary importance and the immediate focus should be on restoring a self-sustaining cover of perennial vegetation to protect the soil and facilitate the natural recolonization of the area by the local fauna and flora.

12. APPENDIXES

Appendix A – Rehabilitation SOP for Tormin Mine, Western Cape Province (2021)

Appendix B – Amended Mining Work Program (2019)

Appendix C- TERRESTRIAL ECOLOGY SPECIALIST STUDY (Todd, 2018)

Appendix D – Topsoil Management Standard Operating Procedure

Appendix E- Alien Invasive Species Management Plan compiled for Tormin Mine (2021)

Appendix F – Comments received from Prof. Patricia Holmes during the consultation process of the rehabilitation plan.

Appendix G – Evidence of works already completed at Tormin Mine

Appendix H – Flow diagram of how the Rehabilitation Plan will be implemented.