PETRA QUARRY

PORTION 0 OF HILLSIDE NO 2830, MANGAUNG MUNICIPAL AREA, FREE STATE PROVINCE

CLOSURE PLAN

DEPARTMENTAL REFERENCE NUMBERS

FS 30/5/1/2/2/10059 MR
FS 30/5/1/2/2/10069 MR

JULY 2025

PREPARED FOR:

Petra Quarry (Pty) Ltd
P.O. Box 13057
Noordstad
Bloemfontein
9302

Contact Person: Me. E van der Westhuizen
Tel: 082 780 0024
E-mail: ellen@raumix.co.za

PREPARED BY:

Greenmined Environmental (Pty) Ltd
Unit M01, No 106 AECI Site
Baker Square, Paardevlei
De Beers Avenue
Somerset West
7130
Contact Person: Ms C Fouché
Tel: 021 851 2673
Cell: 082 811 8514
E-mail: christine.f@greenmined.co.za

EXECUTIVE SUMMARY

Greenmined Environmental (Pty) Ltd is the consultants responsible for the EMPR amendment application, and considering this, an Annual- and Final Rehabilitation, Decommissioning and Mine Closure Plan (*in aliis verbis* Closure Plan) was accordingly drafted in support of the said EMPR.

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 2015 (GN 1228, Financial Provision Regulations 2015 (as amended). The amendment of the closure plan entails a review of the following aspects:

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

Annual Rehabilitation Plan

The MR Holder will annually report on the planned annual rehabilitation actions.

Rehabilitation, Decommissioning and Mine Closure Plan

The decommissioning phase will entail the reinstatement of the processing area by removing the stockpiled material, site infrastructure/equipment no longer needed by the landowner and landscaping the disturbed footprints. Due to the impracticality of importing large volumes of fill to restore the excavation to its original topography, the rehabilitation option is to develop it into a landscape feature. This will entail creating a series of irregular benches along the quarry faces, the top edges of each face being blasted away to form scree slopes on the benches below, thereby reducing the overall face angle.

Environmental Risk Assessment Report:

The floor of the excavation may reveal fluctuating water levels after rehabilitation. Considering this, it is important to adequately block access to the excavation (soil berm / oversize rock in entrance) to prevent unauthorized access to humans (especially children) and domestic animals upon closure of the mine.

LIST OF DEFINITIONS

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

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

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

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

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

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

Design: The documented result of a systematic process during which all relevant factors and criteria are considered. 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 mining process. These areas have been levelled, covered with topsoil, fertilized, seeded, and can support a sustained long-term vegetation cover.

Redundant: No longer required for mining operation.

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

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

Scheduled closure: Planned closure of the mine

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

Topsoil: means the layer of soil covering the earth which –
(a) provides a suitable environment for the germination of seed;
(b) allows for penetration of water; and
(c) Is a source of microorganisms, plant nutrients and in some cases seed.

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

LIST OF ABBREVIATIONS

CoM	Chamber of Mines
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EPA	Environmental Performance Assessment
EMPR	Environmental Management Program
I&AP's	Interested and Affected Parties
ICMM	International Council on Mining and Metals
MPRDA	Mineral and Petroleum Resources Act, 2002 (Act No 28 of 2002)
MR Holder	Petra Quarry (Pty) Ltd
NWA	National Water Act, 1998 (Act No. 36 of 1998)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:AQA	National Environmental Management Air Quality Act, 2004 (Act No 39 of 2004)
NEM:BA	National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
WCMR	Waste Classification and Management Regulations
WWF	World Wildlife Fund

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

Petra Quarry (Pty) Ltd holds a mining right (Ref No: FS 30/5/1/2/2/10059 MR & FS 30/5/1/2/2/10069 MR) to mine aggregate over 54.9874 ha of Portion 0 of the farm Hillside No 2830 in the Mangaung District of the Free State. The mining right was valid until 13 October 2020 upon which it was renewed for a further twenty two (22) years until 14 April 2043.

The 2025 environmental performance audit concluded that the 2015 environmental management programme (EMPR) of Petra Quarry does not fully comply with Appendix 4 of GNR 982. The Quarry has since made various changes and/or improvements on site, and management identified the need to amend/update the EMPR to adequately manage and/or mitigate the environmental impacts associated with the activity as well as ensure legal compliance.

Greenmined Environmental (Pty) Ltd ("Greenmined") is the appointed consultant responsible for the amendment of the EMPR. Accordingly, an Annual Rehabilitation Plan and a Final Rehabilitation, Decommissioning and Mine Closure Plan (hereinafter referred to as the "Closure Plan") have been drafted to accompany the EMPR amendment application. This Closure Plan outlines the rehabilitation methods to be implemented for the restoration of the mining footprint and has been compiled in accordance with Government Notice 940 under the National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA], the NEMA Amendment Act, 2014 (Act No. 25 of 2014), the Financial Provisioning Regulations (Government Notice 1228 of November 2015, as amended), as well as Regulation 62 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) [MPRDA]. The information contained in this report was sourced during the EMPR amendment process to ensure compliance with the relevant legislative requirements for annual and final rehabilitation, decommissioning, and closure planning.

1.1 PROJECT DESCRIPTION

Petra Quarry is an opencast operation where dolerite is extracted. According to the 2015 Environmental Management Programme (EMPR), mining activities at the site were initially established in the 1980s by the Mangaung Municipality and were subsequently taken over by the current Mining Right Holder in 2001.

The Quarry periodically operates 24-hours, 7-days a week especially when material is needed for road related projects. Blasting is permitted only between 08:00 and 17:00, Mondays to Saturdays, and is not allowed on Sundays and public holidays. The day time shift entails the following main activities:

- Drilling and blasting;

- Excavations, loading and hauling material to the processing plant;
- Crushing, screening and stockpiling of material;
- Dispatch; and
- Maintenance and cleaning of the plant.

During the night shift activities are limited to the following:

- Drilling;
- Excavations, loading and hauling of material to the processing plant;
- Crushing, screening and stockpiling of material; and
- Maintenance of the plant.

Sub-contractors are periodically engaged for contract crushing and mining activities and typically establish temporary site camps within the mining boundaries during operations.

Also refer to *4.3 Operational Phase* for a more comprehensive description of the mine operations.

1.2 OBJECTIVE OF THE CLOSURE PLAN

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

The primary objective, at the end of the mine's life, is to obtain a closure certificate 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:

- Demolish and remove all buildings and/or infrastructure that will no longer be required by the landowner, as well as all waste material, in accordance with the requirements of this EMPr and/or the Provincial Department of Mineral Resources and Energy (DMRE).
- Shape and contour all disturbed areas in accordance with the approved Closure Plan.
- Ensure that permanent changes to the topography resulting from mining activities are sustainable and do not pose erosion risks or safety hazards to the landowner or surrounding community.
- Effectively utilise available topsoil to promote the re-establishment of vegetation.
- Ensure that all rehabilitated areas are stable and self-sustaining with adequate vegetation cover.

- Eradicate all invasive and alien plant species by intensive management of the mining area.

2. DETAILS OF THE AUTHOR

Petra Quarry (Pty) Ltd appointed Greenmined Environmental (Pty) Ltd to prepare the closure plan. Ms. Christine Fouché is the responsible consultant for the project and holds a Diploma in Nature Conservation and a B.Sc. in Botany and Zoology (Full CV is attached as Appendix H of the 2025 EMPR).

Name of the Practitioner: Ms Christine Fouché (Senior Environmental Specialist)
Tel No: 021 851 2673
Cell No: 082 811 8514
E-mail address: christine.f@greenmined.co.za

Declaration of Independence:

I, Christine Fouché, in my capacity as environmental assessment practitioner declare that–

- I act as independent environmental officer in this matter;
- I will perform the work relating to this matter 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 related projects, 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 (as amended).

Christine Fouché Date: 23 July 2025

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 establishes a duty on the State to respect, protect, promote, and fulfil the rights enshrined in the Bill of Rights, as set out in Section 7(2).

Section 24 of the Constitution – Environment

Section 24 states that:

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.

This constitutional provision requires that activities which may significantly affect the environment must be assessed and authorised in accordance with applicable legislation to ensure environmental protection and sustainable development.

In addition, Section 24 of the Constitution forms the basis for national environmental management legislation, such as the National Environmental Management Act, 1998 (Act No. 107 of 1998), which empowers the Minister of Forestry, Fisheries and the Environment (or relevant MECs) to identify:

- New activities that require environmental authorisation;
- Areas within which specified activities require environmental authorisation; and
- Existing activities that require assessment and reporting to ensure compliance with environmental standards.

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

SECTION	REQUIREMENT	DISCUSSION
Section 37	Environmental Principles	Requires that the principles in Section 2 of NEMA apply to all prospecting and mining operations. Also obliges sustainable development by integrating social, economic, and environmental factors into planning and implementation.
Section 38	Integrated Environmental Management	Requires mining right holders to manage environmental impacts in accordance with their approved EMPrs. Ensures environmental management throughout the lifecycle of operations.
Section 39	Environmental Management Programme (EMPr)	Details requirements for an EMPr, including baseline assessments, mitigation measures, closure objectives, and financial provisioning to manage environmental impacts. Note: Under One Environmental System (2014), EMPrs are submitted under NEMA but these MPRDA provisions still provide context.
Section 41	Financial Provision	Requires holders to provide financial provision for rehabilitation before commencing operations. Also requires annual assessment of environmental liability to ensure adequacy of financial provisioning.
Section 42	Consultation with Landowners and Interested Parties	Requires consultation with landowners and lawful occupiers regarding environmental management and closure.
Section 43	Closure and Closure Certificate	States that a mining right holder remains responsible for environmental liabilities until a closure certificate is issued. Requires application to the Regional Manager and verification that final rehabilitation, decommissioning, and closure objectives have been met.
Section 44	Removal of Infrastructure	Prohibits removal of buildings, structures, or objects without approval when operations end, ensuring that remaining infrastructure is either properly decommissioned or retained for post-mining land use where beneficial.
Section 45	Minister's Responsibility for Remediation	Provides that if a holder fails to rehabilitate or remediate environmental damage, the Minister may undertake such work and recover costs from the holder.

3.2.1 Mineral Petroleum Resources Development Regulations, 2004 (GN R. 527 of 23 April 2004)

In terms of Government Notice R.527 of 23 April 2004 (MPRDA Regulations), the following closure objectives must be incorporated into an EMPr:

- Θ "Identify key objectives for closure to guide project design and operational management";
- Θ "Develop measures to manage environmental impacts during operations and closure";
- Θ "Provide future land use objectives for the site post-closure"; and
- Θ "Provide proposed closure costs to inform financial provisioning".

Note: Under the One Environmental System, EMPRs are now compiled in terms of the NEMA EIA Regulations, which integrate these requirements with updated financial provision and closure planning standards.

The table below summarises the relevant sections.

Table 2: Summary of the relevant sections of the Mineral Petroleum Resources Development Regulations, 2004

SECTION	REQUIREMENT
Regulation 62 (Chapter 3, Part IV)	EMPrs must include closure objectives, proposed final land uses, management of residual and latent impacts, and detailed costing for closure to ensure financial provisioning aligns with operational and closure requirements.
Regulation 56-59 (Part III: Environmental Management Plans)	Sets out processes for compiling, assessing, and approving EMPrs.
Regulation 60-63 (Part IV: Environmental Management Programmes)	Details content of EMPrs including closure objectives, environmental risk management, and progressive rehabilitation.

3.2.2 Closure Certificate Process (Section 43)

The requirements for issuing a closure certificate is contained in Section 43 of the MPRDA as summarised below:

1. Application to the Regional Manager upon cessation of mining activities.
2. Demonstration of compliance with EMPr commitments, including final rehabilitation and mitigation of residual impacts.
3. DMRE inspection to verify closure implementation.
4. Issuance of certificate to formally release holder from ongoing environmental liabilities, except for latent or residual environmental impacts.

Under the One Environmental System, environmental authorisation (including closure activities) is regulated under NEMA, but closure certificates remain issued under the MPRDA by DMRE.

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

The following sections of NEMA are relevant.

Table 3: NEMA, 1998 applicable sections

SECTION	REQUIREMENT	DISCUSSION
Section 2	Environmental Management Principles	All decisions and activities must integrate environmental, social, and economic factors to ensure sustainable development.
Section 24	Environmental Authorisation	Requires activities listed in the EIA Regulations (including mine closure activities) to undergo environmental impact assessments and obtain authorisation prior to commencement.
Section 24P	Financial Provisioning	Holders of environmental authorisations for mining operations must make financial provision for rehabilitation, closure, and remediation of environmental damage, reviewed annually.
Section 28	Duty of Care	Any person who causes, has caused, or may cause significant pollution or degradation must take reasonable measures to prevent, minimise, or remedy such damage.
Section 44	Regulations	Empowers the Minister to make regulations regarding rehabilitation, closure, and financial provisioning for mining and related activities.

3.3.1 NEMA Financial Provisioning Regulations (GN R. 1147 of 2015, amended)

The National Environmental Management Act (NEMA) Financial Provisioning Regulations, initially published as GNR 1147 in Government Gazette 39425 on 20 November 2015, required holders of mining rights, permits, and authorisations to make financial provision for rehabilitation, decommissioning, closure, and remediation of environmental damage. A transitional period of 39 months was originally provided, with the initial compliance date set for 19 February 2019, later extended multiple times, with the most recent extension moving the compliance deadline to 19 February 2024 in terms of GNR 1889 of 2022.

The draft Financial Provisioning Regulations, 2021, and subsequent draft amendments published in 2022 and 2023, indicate that the finalisation of new

regulations is imminent, with an emphasis on risk-based costing, concurrent rehabilitation, and improved auditing and reporting standards.

In terms of these regulations, the MR Holder must annually review and update their financial provision assessments to cover:

- Annual rehabilitation (progressive rehabilitation during operations)
- Final rehabilitation and decommissioning
- Remediation of latent and residual environmental impacts

These updates must comply with the format and minimum content requirements stipulated in the regulations, including detailed cost tables and calculations similar to those set out in Appendix 5 (Annual Rehabilitation Report) and Appendix 6 (Final Rehabilitation, Decommissioning and Remediation Report) of the 2015 regulations.

The upcoming revised regulations are expected to replace the 2015 provisions, introducing more flexible financial instruments, enhanced auditing obligations, and stronger alignment with mine closure objectives under the One Environmental System.

3.3.2 NEMA EIA Regulations (GN R. 982, as amended)

Under the NEMA EIA Regulations, the decommissioning and closure of facilities, including mining infrastructure and associated activities, may trigger listed activities under Listing Notices 1, 2, or 3, requiring environmental authorisation prior to implementation. Furthermore, Part 3 (Regulations 31 to 35) of the EIA Regulations specifies the requirements and procedures for obtaining amendments to existing environmental authorisations or obtaining specific decommissioning authorisations related to mine closure.

3.3.3 NEMA Waste Act, 2008 (Act No 59 of 2008) [NEM:WA]

The rehabilitation measures must align with the objectives of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA), which aims to protect health, well-being, and the environment by providing reasonable measures for minimising natural resource consumption, avoiding and minimising waste generation, promoting waste reduction, re-use, recycling, and recovery, treating and safely disposing of waste as a last resort, preventing pollution and ecological degradation, securing ecologically sustainable development while promoting justifiable economic and social development, ensuring effective delivery

of waste services, remediating land where contamination presents or may present a significant risk to health or the environment, and achieving integrated waste management reporting and planning.

It further aims to ensure that people are aware of the impact of waste on their health, well-being, and the environment, provides for compliance with these measures, and generally gives effect to Section 24 of the Constitution to secure an environment that is not harmful to health and well-being.

The Waste Classification and Management Regulations, 2013 (GNR 634), promulgated under NEM:WA, facilitate the implementation of the waste hierarchy to divert waste away from landfill towards re-use, recovery, and treatment, separate waste classification from waste management, and provide measures to monitor progress. These regulations enable improved and efficient waste classification and management, safe and appropriate handling, storage, recovery, re-use, recycling, treatment, and disposal of waste, and facilitate accurate reporting on waste generation and management. All waste generators, excluding domestic generators, must classify the waste they generate within 180 days of generation, while wastes classified under the previous “Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste” (DWAF, 1998) must be re-classified and assessed within three years of the commencement of these regulations.

Additionally, Part 8 of Chapter 4 of NEM:WA introduces a legal regime for identifying contaminated land, determining its status and risks, and regulating the remediation process. It obliges owners of significantly contaminated land to report such contamination, imposes obligations on both landowners and polluters with potential financial consequences, and applies where pollution manifests after contamination has occurred or where activities such as excavation change pre-existing contamination. This part is supported by norms and standards for remediation of contaminated land and soil quality, specifying soil screening values for human health and environmental protection. Importantly, it also affects land sales, as sellers who knowingly fail to disclose contamination commit an offence under this Act.

3.4 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 for the management of South Africa’s national water resources to achieve sustainable and

equitable use for the benefit of all water users. The Act requires that water resources are protected to ensure their quality and availability, promotes integrated water resources management, and provides for the delegation of powers to institutions at regional or catchment level to enable effective governance. The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved, managed, and controlled in ways that take into account the meeting of basic human needs of present and future generations, the promotion of equitable access to water, the redress of the results of past racial and gender discrimination, the sustainable use of water to benefit all users, the facilitation of social and economic development, and the protection of aquatic and associated ecosystems and their biological diversity.

The following sections of the NWA, 1998 are relevant.

Table 4: NWA, 1998 applicable sections

SECTION	REQUIREMENT	DISCUSSION
Section 19	Pollution Prevention	Imposes a duty on any person who owns, controls, occupies, or uses land to take reasonable measures to prevent pollution of water resources from occurring, continuing, or recurring. Where pollution cannot be prevented, appropriate measures must be taken to minimise and rectify it.
Section 20	Emergency Incidents	Requires any person responsible for a polluting incident, or any other incident which detrimentally affects a water resource, to report it immediately and to take reasonable measures to contain and minimise the effects, undertake clean-up, and remedy the situation.
Section 21	Water Uses	Defines water uses that require authorisation, including activities such as taking or storing water, impeding or diverting flow, discharging waste or water containing waste into a water resource, disposing of waste in a manner that may detrimentally impact a water resource, altering the bed, banks, course or characteristics of a watercourse, removing underground water, or activities that may impact water quantity or quality.
Section 22	Water Use Authorisation	Specifies that a water use must be authorised by a general authorisation or licence or be permissible under Schedule 1. Authorisation includes compliance with conditions set by the Department of Water and Sanitation.

3.5 ADDITIONAL LEGISLATION RELEVANT TO MINE REHABILITATION

- Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983);
- Mine Health and Safety Act, 1996 (Act 29 of 1996)
- National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEM:BA)

- Θ National Forests Act, 1998 (Act 84 of 1998)
- Θ National Heritage Resources Act, 1999 (Act 25 of 1999)
- Θ Occupational Health and Safety Act, 1993 (Act 85 of 1993)

3.6 BEST PRACTICE AND INTERNATIONAL GUIDELINES

Mine closure remains a global environmental and socio-economic challenge, with regulatory frameworks and best practice continuously evolving to address legacy impacts, sustainability, and social transition. In South Africa, several key guidelines and regulations guide mine closure planning and implementation.

The Department of Mineral Resources and Energy (DMRE) has published the “Financial Provisioning Regulations” (GNR. 1147 of 2015, amended in 2022) under the National Environmental Management Act (NEMA), which outline requirements for financial provisioning to manage rehabilitation, decommissioning, and closure obligations. These regulations aim to ensure that funds are available for environmental liabilities throughout the mine’s life and post-closure. The DMRE Mine Closure Guidelines (2005) remain a formal reference under Regulation 54(1) of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), particularly for closure cost assessments. However, an updated national mine closure guideline is under development to align with integrated environmental management and the One Environmental System approach.

The Council for Geoscience (2020) has advanced work on the National Mine Closure Strategy, which focuses on risk-based closure planning, prioritisation of high-risk sites, and sustainable post-mining land use to reduce South Africa’s burden of derelict and ownerless mines.

Internationally, the ICMM (International Council on Mining and Metals) 2019 “Integrated Mine Closure: Good Practice Guide” (2nd edition) sets out industry-leading principles for closure planning. This guide emphasises:

- Θ Early integration of closure into project design.
- Θ Stakeholder engagement to support post-mining land use goals.
- Θ Progressive rehabilitation to reduce residual liabilities.
- Θ Social transition planning to mitigate economic impacts on communities post-closure.

Similarly, the Australian Department of Industry, Science, Energy and Resources (2021) published its “Leading Practice Sustainable Development Program for the Mining Industry – Mine Closure” guideline. This updated document reaffirms that mine closure planning

should begin during the project's feasibility stage and continue as an iterative process throughout the life of mine. This ensures realistic final landform designs, cost-effective rehabilitation, and effective relinquishment pathways.

The World Bank (2018) in its report "Mine Closure: A Checklist for Governments" highlights that successful mine closure requires a combination of regulatory oversight, enforceable financial provision mechanisms, clear accountability for closure outcomes, and planning for post-mining economic diversification to avoid ghost towns or socio-economic decline.

Finally, the WWF-SA (2012) discussion document remains relevant in emphasizing financial adequacy for closure, but newer research by Centre for Environmental Rights (CER, 2019) and WWF-SA (2020) has stressed the persistent gaps in financial provision compliance and the urgent need for enforceable closure strategies to prevent the proliferation of abandoned mines.

4. ENVIRONMENTAL AND PROJECT CONTEXT

4.1 PROJECT LOCATION

Table 5: Location of the activity.

Farm Name	Portion 0 of the farm Hillside No 2830	
Mining Area (Ha)	54.9874 ha	
Magisterial District	Mangaung Metropolitan Municipality	
Distance and direction from the nearest town	Petra Quarry is situated within Bloemfontein, ±5 km north of the Central Business District (CBD). The mine is accessed from Christo Groenewald Street and bordered by the R700 also known as Kenneth Kaunda Road.	
21 digit Surveyor General Code for each farm portion	F00300000000283000000	
Site Coordinates	A 29°03'30.75" S	26°14'29.32" E
	B 29°03'37.41" S	26°14'55.87" E
	C 29°03'55.15" S	26°14'55.72" E
	D 29°03'55.13" S	26°14'48.80" E
	E 29°03'56.29" S	26°14'47.00" E
	F 29°03'55.83" S	26°14'44.66" E

	G 29°03’55.91” S	26°14’42.47” E
	H 29°03’55.87” S	26°14’39.77” E
	I 29°03’56.17” S	26°14’38.81” E
	J 29°03’57.67” S	26°14’38.43” E
	K 29°03’58.44” S	26°14’37.94” E
	L 29°03’58.50” S	26°14’37.74” E
	M 29°03’58.18” S	26°14’30.82” E
	N 29°03’55.06” S	26°14’30.91” E
	O 29°03’55.03” S	26°14’29.15” E
	P 29°03’48.80” S	26°14’29.17” E
	Q 29°03’52.44” S	26°14’21.72” E
	R 29°03’45.88” S	26°14’19.45” E
	S 29°03’41.06” S	26°14’29.24” E

Figure 1: Satellite view of the Petra Quarry mining footprint (image obtained from Google Earth).

4.2 SITE ESTABLISHMENT PHASE

Petra Quarry has been in continuous operation for more than 45 years. As such, the site has already undergone full establishment in accordance with the applicable regulatory requirements. Consequently, the site establishment phase is no longer applicable to this operation.

4.3 OPERATIONAL PHASE

4.3.1 Site Infrastructure

Petra Quarry has well-established buildings and infrastructure that support its mining operations. The site is accessed via Christo Groenewald Street turning west

off the R700 (Kenneth Kaunda) road that also provides access to the Northern Landfill site of Bloemfontein.

The administrative buildings of Petra Quarry accommodate the office personnel, and the ablution facilities associated with the office complex and workshops drain to a septic tank system, which is serviced as required.

The following main areas are defined at the mine as indicated in the following figure:

1. Explosives Destruction Area;
2. Excavation;
3. Processing Areas;
4. Workshops and Storage Areas
5. Salvage Yard and Wash Bay;
6. Stockpile Areas;
7. Parking Area;
8. Office Complex; and
9. Entrance.

Figure 2: Satellite view of the various operational areas at Petra Quarry where the brown line shows the mine boundary (image obtained from Google Earth).

4.3.2 Excavation and Processing

The MR Holder mines the excavation through the opencast mining method where the topsoil (if any) is stripped and stockpiled separately before the excavation is expanded. The dolerite is loosened by conventional drilling and blasting methods.

Blasted material (muck pile) is removed from the pit using excavators and trackless mobile machinery (TMMs) and transported to the Primary Plant, where it is deposited onto the surge pile. Material from the surge pile is conveyed to the Secondary Plant and subsequently processed at the Main Plant, where it is screened into various aggregate sizes.

The Sand Plant processes both oversize material and -5 mm dust transported from the Main Plant. This material is crushed and washed to produce -6 mm washed sand.

Wash Plant 1 receives 19 mm, 13 mm, and 9.5 mm concrete stone from the Main Plant. These materials are fed into a feeder bin and processed through a BARMAC (Vertical Shaft Impact crusher) to enhance shape, followed by screening and washing to produce various sizes of Roadstone.

Wash Plant 2 screens and washes 6.7 mm concrete stone transported from the Main Plant to produce 6.7 mm Roadstone and a 6.3 mm special product intended for a brick-making supplier.

4.3.3 Water Use

Potable water is sourced from the Mangaung Municipality.

Storm water collects on the quarry floor and flow towards the lowest section of the pit (sump) from where it is used for dust suppression as well as in the process water system. Storm water that enters the processing areas runs to the settlement ponds from where it is re-used at the crushers.

4.3.4 Electricity Use

The mining operation is supplied with municipal power from the nearby power line. Gensets are used as back-up power.

4.3.5 Servicing and Maintenance

The well-equipped brick workshops of the Quarry, that forms part of the office complex, are used for the repair and maintenance of all mining related equipment and machinery. Water from the wash bay drains into an oil separator while clean stormwater is directed away from the dirty areas via berms and channels.

Fuel is stored in a 23 000 l tank in a bunded area. Chemicals are stored in designated storage areas in accordance with the product specific material safety data sheets.

4.3.6 Waste Management

The MR Holder has an integrated waste management policy, and the company strives to recycle where possible.

Presently, waste is separated into waste that can be re-used, and those that must be removed from the site. General waste (that cannot be reused) is removed by the Quarry to the nearby Northern Landfill site of Bloemfontein. Hazardous waste is removed from site by qualified hazardous waste handling contractors.

The ablutions of the mine drains into a closed-system septic tank that is serviced by a registered liquid waste removal service provider when needed.

4.3.7 Labour Component

Presently (June 2025), Petra Quarry has a permanent labour component of 40 employees. Sub-contractors are periodically employed for contract crushing and mining operations, who then bring their own personnel. The permanent employees of the Quarry mainly reside in Bloemfontein, Botshabelo and Thaba 'Nchu and are daily transported to site. No employees (permanent and/or sub-contractor) reside on site.

4.4 TOPOGRAPHY

The topography of the greater area is characterized by gently rolling plains and grasslands, typical of the Highveld region. Nearer to Petra Quarry (±1 km radius) the terrain is predominantly flat to gently undulating, with elevations ranging approximately between 1 485 and 1 638 meters above sea level (masl). The landscape consists mainly of open grasslands, interspersed with occasional rocky outcrops and isolated hills.

The topography of the mining area features a high-altitude plateau with the elevation decreasing from the north-eastern corner towards the southern boundary, whereafter the elevation gradually rises towards the western & north-western parts of the mine.

Also refer to Section F of the 2025 EMPR.

4.5 VISUAL CHARACTERISTICS

The visual character of the surrounding landscape, located on the north-eastern periphery of Bloemfontein, is defined by a combination of natural Highveld grassland and human-modified rural-industrial elements.

The area is semi-rural, with agricultural lands, quarrying operations, and limited low-density development visible in the wider area. Petra Quarry introduces a prominent man-made feature into the landscape, characterized by exposed rock faces, access roads, and altered land surfaces. These features introduce a distinctly industrial element into an otherwise semi-natural environment.

In summary, the overall visual impression is one of a utilitarian rural landscape with pockets of disturbance, rather than a pristine or highly scenic environment.

Also refer to Section F of the 2025 EMPR.

4.6 AIR QUALITY AND NOISE AMBIANCE

The general air quality in the vicinity of Petra Quarry is characteristic of a semi-rural environment influenced by both natural conditions and localized anthropogenic activities. The area is dominated by open grassland with relatively low background levels of air pollution under natural conditions. However, air quality is periodically affected by the following:

- Quarrying operations, including blasting, crushing, and materials handling, which contribute to the generation of particulate matter, particularly during dry and windy conditions.

- Heavy vehicle movement on unpaved haul roads, which can further increase dust levels.

- Emissions from the adjacent Bloemfontein landfill site may include windblown dust, biodegradable gas emissions (such as methane and hydrogen sulphide), and occasional burning of waste, which introduces odorous or noxious compounds into the local atmosphere.

- Regional contributions from agricultural burning, unpaved roads, and emissions at the adjacent asphalt- and ready-mix plants.

Overall, while the broader region enjoys moderate to good air quality, localized deterioration occurs intermittently in the immediate surroundings of Petra Quarry due to dust-generating activities and the nearby landfill.

The ambient noise environment around Petra Quarry reflects the semi-rural and industrial-transition character of the area. Under natural conditions, baseline noise levels are low and shaped primarily by natural sources such as wind through grasslands, birdlife, and occasional agricultural activities. However, anthropogenic noise sources are present and include:

- Operational noise from the Quarry, such as blasting (intermittent), rock crushing, material loading, and movement of heavy vehicles and machinery.

- Vehicular noise from haul trucks collecting material from the Quarry, Asphalt Plant and Ready-mix Plant, and traveling along regional and internal gravel roads.

- Activities at the Bloemfontein landfill site, including compactors, waste delivery trucks, and occasional mechanical operations, contribute to a background industrial noise layer.

- Limited noise intrusion from the urban edge of Bloemfontein during certain times of the day, depending on prevailing wind direction.

The development of Northridge Estate and the complex north of Christo Groenewald Road introduces a residential setting with higher noise sensitivity. While the residential areas are not immediately adjacent to the Quarry itself, residents may experience intermittent noise impacts, particularly from passing trucks and blasting events if not adequately buffered, timed, and communicated.

Also refer to Section F of the 2025 EMPR.

4.7 GEOLOGY

The Karoo Supergroup of Permian age consists of successions of the Dwyka Formation, Ecca Groups at the bottom; followed by the overlying Beaufort Group; then the Molteno-, Elliot- and Clarens Formations and finally on top the Drakensberg - & Lebombo Groups. The Beaufort Group overlies the Ecca Group and consists of alternating mudstone (red in places) and sandstone. The Beaufort Group sub-divides into the lower Adelaide – and upper Tarkastad Subgroups. The Adelaide Subgroup further subdivides into the lower Abrahamskraal Formation (1500-2000 m thick) and an upper Teekloof Formation (±1400 m thick) with the boundary arbitrarily at the base of the so-called “Poortjie Sandstone”. Jurassic-age dolerite extensively intrudes the Beaufort Group as dykes and sheets.

Although the Adelaide Subgroup consists mainly of sandstones and mudstones, the quarry is found in a dolerite extrusion within the Abrahamskraal Formation. The targeted mineral in the quarry is therefore the dolerite, which forms the majority of the rock mass of the quarry.

Also refer to Section F of the 2025 EMPR.

4.8 HYDROLOGY

The Quarry is situated in the Riet-Modder sub-water management area that forms part of the Upper Orange Water Management Area (WMA ID 12).

The landscape is largely devoid of perennial rivers or streams within the immediate 1 – 2 km radius of the Quarry. Drainage occurs primarily through ephemeral drainage lines or non-perennial watercourses, which become active only during and immediately after rainfall events, typically between October and March. These seasonal drainage features are shallow and ill-defined, often forming part of the natural runoff network over grassland and disturbed surfaces.

One such non-perennial drainage lines / stream passes the southern boundary of the mining area that is highly overgrown by reeds (*Arundo donax*). The water quality of this stream is generally highly polluted as it carries the stormwater from the landfill site and other semi-industrial sites. Where the stream passes the mining area (southern boundary) a stormwater berm was added that directs the water draining from the mining area through a sediment trap before it flows into the stream.

There are no natural wetlands, pans, or dams within the immediate footprint of Petra Quarry, however rain water accumulates in the sump of the quarry from where it is extracted and used for dust suppression at the mine. The mine also has settlement ponds that receive the process water from the wash plants.

Groundwater resources are typically shallow and discontinuous, and are vulnerable to contamination from surface sources, especially where aquifers are unconfined. The depth of the water table in the vicinity of the Quarry is ±25 m.

Also refer to Section F of the 2025 EMPR.

4.9 TERRESTRIAL BIODIVERSITY AND GROUNDCOVER

According to Mucina and Rutherford (2012) the natural vegetation types of the study area comprises the Winburg Grassy Shrubland (Gh7) and the Bloemfontein Karroid Shrubland (Gh8).

Through the years most of the natural vegetation cover of the mining area has been removed. Presently (2025), only ±19% of the mining footprint still resembles the initial vegetation layer in particular the Winburg Grassy Shrubland in the south-eastern corner of the mine. A few indigenous Wild Olive Trees (*Olea europaea* subsp. *africana*) occurring within the active mining area were fenced to ensure protection.

No endangered plant species occur within the mining footprint that needs special protection and/or management practices. The MR Holder removes the vegetation cover with the topsoil (where available) that is stockpiled separately to be used during the rehabilitation phase. Invader plant species occur in the disturbed areas that are continuously controlled.

Also refer to Section F of the Amended EMPR.

4.10 FAUNA

Petra Quarry operates within a highly disturbed area with very little to no fauna resident within the mining area. Rock hyrax (*Procavia capensis*) frequent the quarry faces and rocky areas, while common bird species occur at the mine.

Furthermore, the Quarry has been operational since the 1980's and the remaining faunal component has therefore become accustomed to the mining operations. No endangered species reside within the mining footprint that warrants special consideration.

Also refer to Section F of the Amended EMPR.

4.11 CULTURAL AND HERITAGE ENVIRONMENT

No sites of archaeological or cultural importance is present on the site. Neither did the mining operations of the past ±45 years identify any artefacts or areas of archaeological and/or palaeontological concern.

4.12 LAND USE

Historically, the Petra Quarry area formed part of the municipal commonage and was primarily utilised for agricultural purposes, specifically livestock grazing, due to its open grassland nature and proximity to communal farming areas.

Subsequent to its agricultural use, the Mangaung Municipality initiated mining activities on the site for the extraction of dolerite, a common construction aggregate material. In June 2001, Petra Quarry (Pty) Ltd assumed operational control of the existing quarry and has continued mining activities to the present day under applicable authorisations.

The current land use of the site is thus classified as mining and industrial, focused on the extraction, crushing, and stockpiling of dolerite aggregate for the regional construction market.

Also refer to Section F of the Amended EMPR.

5. ANNUAL REHABILITATION PLAN

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

a) review concurrent rehabilitation and remediation activities already implemented;
b) establish rehabilitation and remediation goals and outcomes for the forthcoming 12 months, which contribute to the gradual achievement of the post-mining land use, closure vision and objectives identified 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 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 operating period to ensure the timeous submission of the subsequent annual review.

5.2 MONITORING RESULTS

5.2.1 Control of Invasive Plant Species

The MR Holder continuously monitors the mining footprint for alien invasive plant species in accordance with the Invasive Plant Species Management Plan of the site (Appendix E of the 2025 EMPR). The most common invasive plant species that occur in the disturbed areas include (but not limited to) the following:

Θ *Argemone mexicana*	Mexican Poppy	NEM:BA Category 1b
Θ *Cereus jamacaru*	Queen of the Night	NEM:BA Category 1b
Θ *Cirsium vulgare*	Scotch Thistle	NEM:BA Category 1b
Θ *Datura stramonium*	Common Thorn Apple	NEM:BA Category 1b
Θ *Nicotiana glauca*	Wild Tobacco	NEM:BA Category 1b
Θ *Pennisetum setaceaum*	Fountain Grass	NEM:BA Category 1b
Θ *Pyracantha angustifolia*	Yellow Firethorn	NEM:BA Category 1b

Θ	*Ricinus communis*	Castor-oil Plant	NEM:BA Category 2
Θ	*Sesbania punicea*	Red Sesbania	NEM:BA Category 1b
Θ	*Solanum elaeagnifolium*	Silverleaf Bitter Apple	NEM:BA Category 1b
Θ	*Xanthium spinosum*	Spiny Cocklebur	NEM:BA Category 1b
Θ	*Xanthium strumarium*	Large Cocklebur	NEM:BA Category 1b

The monitoring and management of invasive plant species will continue throughout the operational-, and decommissioning phases of the project

5.2.2 Noise Monitoring

The MR Holder contracts a qualified Occupational Hygienist to quarterly monitor and report on the personal noise exposure of the employees working at the quarry. The monitoring is done in accordance with the SANS 10083:2004 (Edition 5) sampling method as well as NEM:AQA; SANS 10103:2008.

Noise zones are demarcated on site as recommended by the specialist and all employees working within the noise zones or with noisy equipment are supplied with sufficient ear protection.

5.2.3 Blast Monitoring

The ground vibrations of each blast event are monitored and subsequently captured into a report stating its compliance with the USBM limits (RI 8507, 1980).

5.2.4 Fallout Dust Monitoring

Petra Quarry conducts monthly monitoring of fallout dust levels, and the results are compared with the standards prescribed in the National Dust Control Regulations, 2013 (as amended). The site has four dust monitoring units that are situated at the following GPS Coordinates:

Table 6: Locations of the fallout dust monitoring units (EEC)

Sample Site Number	Location Description	Directional Location	Co-Ordinates	
			South	East
1	East of stockpiles	East	29° 03'46.6"	26° 14'20.4"
2	South of Quarry	South	29° 03'41.5"	26° 14'30.2"
3	West of Quarry	West	29° 03'38.9"	26° 14'53.2"
4	At Entrance	North	29° 03'51.7"	26° 14'30.3"

5.2.5 Water Quality Monitoring

Petra Quarry implements a water quality monitoring programme that includes the bi-annual testing of municipal water to verify its compliance with drinking water standards. In addition, water samples are taken from the two quarry pit sumps, the slimes dams (settling ponds), drainage line (when water is available), and the last chamber of the oil sump, ensuring that potential contamination is promptly identified and addressed. These monitoring efforts form part of the quarry's broader commitment to environmental compliance and pollution prevention. All laboratory results and associated records are maintained on site and are readily available for auditing and regulatory review.

5.3 SHORTCOMINGS IDENTIFIED

Currently, no shortcomings were identified that require amendment of the Annual Rehabilitation Plan in terms of the Financial Provision Regulations, 2015 to be submitted to DMRE for approval. Site management must take note that rehabilitated areas must be managed as no-go areas to allow the re-establishment of the cover crop. Rehabilitation is only deemed successful once the cover crop is well established.

5.4 REHABILITATION ACTIVITIES FOR FORTHCOMING 12 MONTHS

Progressive rehabilitation entails the use of dried fines from the settling ponds to slope mined benches. During the audit period (June 2024 – May 2025) progressive rehabilitation focused on the south-eastern benches of the quarry pit. Rehabilitation will continue as fines from the settling ponds become available.

The progress of rehabilitation activities will be documented and reported as part of the annual review of the financial provision and closure plan, in accordance with applicable legislative requirements.

5.5 REVIEW OF PREVIOUS YEAR'S REHABILITATION ACTIVITIES

The rehabilitation of the south-eastern benches of the pit commenced in ±2021 and will continue until the area has been shaped and landscaped. No shortcomings were identified in terms of the rehabilitation activities at this time.

5.6 COSTING

The table below outlines the estimated costs associated with the rehabilitation of the south-eastern benches for the 2024/2025 period, along with the expenses incurred by the company in implementing the required environmental monitoring plans.

Table 7: Annual rehabilitation and monitoring related cost.

PROPOSED ANNUAL MONITORING COST	
ITEM	**ANNUAL COST**
Rehabilitation of the southern part of the old quarry	±R 14 023.00
Blast Monitoring	No additional cost
Dust and Noise Monitoring	±R 55 800.00
Water Monitoring	±R 38 620.00
TOTAL	**±R 108 443.00**

6. REHABILITATION, DECOMMISSIONING AND MINE CLOSURE PLAN

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

a) providing the vision, objectives, targets and criteria for final rehabilitation, decommissioning, and closure of the project;
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 proposed; 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 as component. The first step in developing the overall mine closure strategy is to identify potential post mining land use options and establish key objectives for closure to be incorporated in the project design.

The preferred post mining land use for the mine is to restore the natural vegetation (where possible) and allow the continued use of the surrounding area for municipal use. In this context, the primary objectives for the closure of the mining operations are:

- Demolish and remove all buildings and/or infrastructure that will no longer be required by the landowner, as well as all waste material, in accordance with the requirements of this EMPr and/or the Provincial Department of Mineral Resources and Energy (DMRE).
- Shape and contour all disturbed areas in accordance with the approved Closure Plan.
- Ensure that permanent changes to the topography resulting from mining activities are sustainable and do not pose erosion risks or safety hazards to the landowner or surrounding community.

- Effectively utilise available topsoil to promote the re-establishment of vegetation.
- Ensure that all rehabilitated areas are stable and self-sustaining with adequate vegetation cover.
- Eradicate all invasive and alien plant species by intensive management of the mining area.

6.1 CLOSURE STRATEGY GUIDED BY ENVIRONMENTAL RISK ASSESSMENT

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

The rehabilitation procedures was formulated to optimise the extraction of the raw material while creating a stable excavation that will not present an unreasonable safety risk once the mine was closed. Mining operations will be conducted in stages, corresponding to the creation of precision blasted quarry sides and benches towards the base of the workings. The decommissioning phase and closure of the quarries will also involve removal of all debris and rehabilitation of areas not rehabilitated during the operational phases of the project. This will comprise the scarification of compacted areas, reshaping of areas, topsoiling and regeneration of all prepared surfaces. All infrastructure/equipment not required by the landowner will be dissembled, and all other infrastructural development such as haulage roads and stockpile areas will be rehabilitated.

Upon closure of the mining area infrastructure, equipment, plant, and other items used during the mining period and no longer needed by the landowner will be removed. The MR Holder will, for as far as it is reasonably practicable, rehabilitate the environment affected by the mining operation to its natural or a predetermined state or to a land use which conforms to the generally accepted principle of sustainable development.

6.2 DESIGN PRINCIPLES

6.2.1 Excavation

The design principles proposed for the rehabilitation of Petra Quarry was determined through discussions with site management, guidance from the 2015 EMPR, and the minimum closure objectives as prescribed by DMRE.

Upon closure of the mine the MR Holder will contract the expertise of a rock engineer to guide the final design of the quarries. The rock engineer will be directed by the following:

- The excavation must be developed into a landscape feature, by creating a series of irregular benches along the faces. The top edges of each face being blasted away to form scree slopes on the benches below, thereby reducing the overall face angle (<85˚).

- Presently, it is proposed that the benches must be ±12 m high x 3 m wide. However, site management must be directed by the rock engineer regarding the final layout of the benches.

- The benches of the excavation must be top-dressed with topsoil and vegetated with an appropriate grass mix if vegetation does not naturally establish in the area within six months of the replacement of the topsoil.

6.2.2 Processing- and Stockpile Areas

The processing- and stockpile areas will be reinstated and the footprint landscaped as listed below.

- Coarse natural material used for the construction of ramps must be removed and dumped into the excavation.

- Stockpiles must be removed during the decommissioning phase, the area ripped, and the topsoil returned to its original depth to provide a growth medium.

- Θ On completion of operations, all structures or objects shall be dealt with in accordance with section 44 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002):
  - Where sites have been rendered devoid of vegetation/grass or where soils have been compacted owing to traffic, the surface shall be scarified or ripped.
  - The site shall be seeded with a vegetation seed mix adapted to reflect the local indigenous flora.

- Θ Photographs of the processing area, before and during the mining operation and after rehabilitation, shall be taken at selected fixed points and kept on record for the information of the DMRE Regional Manager.

- Θ On completion of mining operations, the surface of these areas, if compacted due to hauling and dumping operations, shall be scarified to a depth of at least 200 mm and graded to an even surface condition. Where applicable/possible topsoil needs to be returned to its original depth over the area.

- Θ The area shall then be fertilized if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local, adapted indigenous seed mix.

6.2.3 Settling Ponds

- Θ Dewatering: Water flow into the ponds must cease. Remaining water must be pumped out into approved containment areas or for dust suppression, ensuring water quality compliance with discharge permits. Sediment must be allowed to dry sufficiently to support equipment and personnel without risk of bogging or collapse.

- Θ Backfilling: The ponds must be backfilled with clean, competent material from overburden stockpiles or suitable inert waste rock, and the layers must be compacted to prevent future subsidence.

- Θ Shaping and Profiling: The rehabilitated pond area must be shaped to integrate with the surrounding natural topography. No ponding may be allowed.

- On completion, topsoil needs to be returned to its original depth over the area. The area shall then be fertilized if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local, adapted indigenous seed mix.

6.2.4 Offices, Workshops, and Storage Areas

The buildings (such as the offices, workshops, ablutions, and storage areas) and roads of the mine will most likely be retained for future use by the landowner and will therefore not be demolished unless required by the landowner.

6.3 POST-MINING LAND USE

Upon replacement of the topsoil, the areas around the excavation will once again be available for municipal use, and the planting of the grass layer (to protect the topsoil) will tie in with the proposed land use.

Figure 3: Satellite image of the processing and associated mining areas (blue shaded polygon) that will revert to municipal use upon rehabilitation, while the excavation (red shaded polygon) will be rendered safe and left as a landscape feature. The mining footprint is indicated by the red line.

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 MR Holder will comply with the minimum closure objectives as prescribed by the DMRE and detailed below:

6.4.1 Rehabilitation of the Excavated Areas

- Θ The excavated areas must serve as a final depositing area for the placement of overburden. Rocks and coarse material removed from the excavation must be dumped into the excavation.
- Θ No waste may be permitted to be deposited in the excavation.
- Θ Once overburden, rocks and coarse natural materials has been added to the excavation and it was profiled with acceptable contours and erosion control measures, the topsoil previously stored must be returned to its original depth over the area.
- Θ The areas must be fertilized if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix to propagate the locally or regionally occurring flora, should natural vegetation not re-establish within 6 months from closure of the site.
- Θ If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area be seeded with a vegetation seed mix to his or her specification.

6.4.2 Rehabilitation of Processing- and Stockpile Areas

- Θ Coarse natural material used for the construction of ramps must be removed and dumped into the excavation.
- Θ Stockpiles must be removed during the decommissioning phase, the area ripped, and the topsoil returned to its original depth to provide a growth medium.
- Θ On completion of operations, all structures or objects shall be dealt with in accordance with section 44 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002):

- Where sites have been rendered devoid of vegetation/grass or where soils have been compacted owing to traffic, the surface shall be scarified or ripped.
- The site shall be seeded with a vegetation seed mix adapted to reflect the local indigenous flora.

Θ Photographs of the processing area, before and during the mining operation and after rehabilitation, shall be taken at selected fixed points and kept on record for the information of the DMRE Regional Manager.

Θ On completion of mining operations, the surface of these areas, if compacted due to hauling and dumping operations, shall be scarified to a depth of at least 200 mm and graded to an even surface condition. Where applicable/possible topsoil needs to be returned to its original depth over the area.

Θ The area shall then be fertilized if necessary to allow vegetation to establish rapidly. The site shall be seeded with a local, adapted indigenous seed mix.

Θ If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the DMRE Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation be corrected and the area be seeded with a seed mix to his or her specification.

6.4.3 Final Rehabilitation

Θ Rehabilitation of the surface area shall entail landscaping, levelling, top dressing, land preparation, seeding (if required), maintenance, and clearing of invasive plant species.

Θ All equipment, plant, and other items used during the mining period must be removed from the site (section 44 of the MPRDA).

Θ Waste material of any description, including receptacles, scrap, rubble and tyres, must be removed entirely from the mining area and disposed of at a recognized landfill facility. It will not be permitted to be buried or burned on the site.

Θ The management of invasive plant species must be done in a sporadic manner during the life of the mining activities. Species regarded as Category 1a and 1b invasive species in terms of NEM:BA (National Environmental Management: Biodiversity Act 10 of 2004 and regulations applicable thereto) need to be eradicated from the site.

- Final rehabilitation must be completed within a period specified by the Regional Manager (DMRE).

6.4.4 Revegetation of Rehabilitated Areas

All reinstated areas must be revegetated to establish a stable grass layer that will tie-in with the end-use of the site. The use of a commercial seed mix is recommended, and for dryland areas, the seed mix should not be less than half the standard sowing rate and include annuals (e.g. wheat or rye) and perennials e.g. Couch Grass (*Cynodon dactylon*). The seed mix can be augmented by Weeping Love Grass (*Eragrostis curvula*) and Red Grass (*Themeda triandra*).

6.4.5 Maintenance and Monitoring

Rehabilitated areas need to be monitored and managed after the initial rehabilitation. The mine'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 invasive plant species control.

6.4.6 Success Criteria and Monitoring

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

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

When selecting completion criteria, consideration must be given to the climatic conditions in the area. Using simple percentage species and percentage cover may

not be appropriate, as this is dependent on when the samples are taken. 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.

6.4.7 Impact Specific Procedures

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

Table 8: Summary of the impact specific procedures

CLOSURE MANAGEMENT OBJECTIVES	SPECIFIC PERFORMANCE CRITERIA	ACTION REQUIRED
SOCIO-ECONOMIC		
Θ The retrenchment process will be followed as per requirements of the applicable legal process; and Θ All existing social investments will be phased out over an agreed period with beneficiaries.	Θ Progressive rehabilitation must be implemented if possible as mining progress.	Θ 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		
Θ The area will have contours constructed to prevent soil erosion.	Θ All slopes which may incur erosion will be profiled in such a way that a preferential down drain can be installed; Θ Erosion control measures such as contour banks and cut off berms should be constructed, and soil vegetated in rehabilitated areas. On gentle slopes, water will be encouraged to flow off the rehabilitated surface as surface flow, as quickly as possible without causing erosion.	Θ 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; Θ Any pooling (outside excavation) will be addressed by filling depression and / or grading areas and re-vegetating such sites; Θ Any erosion will also be addressed utilising contour berms, gabion structures if necessary or a specialist will be consulted if necessary. Any eroded soils will be lifted and returned to the affected area; Θ Any deficiencies will be corrected by placing material in these areas as per the closure plan; Θ Any compacted soils will be ripped or disked and re-vegetated with indigenous flora. Vegetation will then be monitored in these areas; Θ All recommendations made by the specialists will be implemented where deemed appropriate; Θ An invasive plant species management program will be implemented for the control and eradication of alien

CLOSURE MANAGEMENT OBJECTIVES	SPECIFIC PERFORMANCE CRITERIA	ACTION REQUIRED
		invasive species on site. This plan will give preference to mechanical control methods. Any chemicals utilised will be used responsibly. Where required DWS will be consulted with regards to the use of certain chemicals.
ECOLOGY		
Θ The rehabilitated area will be protected from surface disturbance to allow vegetation to establish and stabilise.	Θ Vegetation in rehabilitated areas will have equivalent values as surrounding natural ecosystems; Θ The rehabilitated ecosystem will have equivalent functions and resilience as the target ecosystem; Θ Soil properties will be appropriate to support the target ecosystem; Θ The rehabilitated areas will provide appropriate habitat for fauna.	Θ 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; Θ An invasive plant species management programme will be implemented for the control and eradication of alien invasive species on site. This plan will give preference to mechanical control methods. Any chemicals utilised must be used responsibly.
LAND USE		
Θ To ensure that rehabilitation is done to such an extent that land use potential is regained for municipal use and associated zoning.	Θ Only after the shaped areas have been inspected and approved by the Mine Manager/Site Manager will topsoil be placed to a depth of 300 mm. The topsoil layer must be as even as possible, i.e. it must be smooth, and the depth must remain consistent throughout; Θ Once the topsoil has been replaced, vehicle movement will be restricted to prevent compaction of the topsoil; Θ Rehabilitated areas will be vegetated within the same growing season (at the end of the rainy season). A suitable seedbed will be prepared to enhance the penetration and absorption of water, thereby giving the seed the best possible chance to germinate. The seeding depth should be very shallow to provide better germination. For most grass species seeding depth is approximately 5-15 mm; Θ Rehabilitated areas will be re-vegetated with local indigenous flora as far as possible; and	Θ N/A

CLOSURE MANAGEMENT OBJECTIVES	SPECIFIC PERFORMANCE CRITERIA	ACTION REQUIRED
	Θ Once the seed mixture has been sown, the land must be rolled to ensure consolidation around the seeds and effective moisture retention.	

6.5 CLOSURE SCHEDULE

At this stage it is proposed that the rehabilitation of the mining area will take approximately twelve months to complete.

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

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

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

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

Table 9: Closure schedule.

CLOSURE SCHEDULE	
DECOMMISSIONING / CLOSURE ACTION	**TIMEFRAME**
EXCAVATION	
Excavation: Θ Slope all faces according to final design principals; Θ Deposit available building rubble and overburden into the quarry floor;	Week 1 – 12
Haul Roads: Θ Rip, level, and landscape all haul roads no longer required by landowner; Θ Leave the haul roads around the excavation in an acceptable condition to be used by the landowner after mine closure;	Week 12 - 14

CLOSURE SCHEDULE	
DECOMMISSIONING / CLOSURE ACTION	**TIMEFRAME**
General Surface: Θ Cover the final floor of the quarry, the top of the benches and access road slopes with 300 mm of topsoil and re-vegetate with indigenous grasses.	Week 14 - 25
PROCESSING AREA	
Crushing Plant: Θ Dismantle and remove the crushing plants and associated infrastructure and ramps; Θ Remove concrete foundations associated with the plants;	Week 26 - 38
Stockpile Area: Θ Remove all remaining stockpiled material; Θ Remove overburden dumps;	Week 39 - 41
Settling Ponds: Θ Pump the remaining water from the ponds and allow the area to dry; Θ Backfill the ponds and compact the layers; Θ Shape the rehabilitated area to prevent ponding; Θ Spread topsoil over the area and apply approved seed mix;	Week 39 - 41
Supporting infrastructure: Θ Remove all mobile containers/temporary infrastructure; Θ Break up the concrete bunded areas and concrete associated with the weigh bridge and other supporting infrastructure; Θ Break down the buildings and auxiliary structures (if no longer needed by the landowner); Θ Clean-up any contaminated soil; Θ Remove diesel- and used oil tanks; Θ Remove all waste to a suitable licenced waste disposal facility.	Week 41 – 46
General Surface: Θ Scarify all compacted areas; Θ Level and landscape entire footprint area; Θ Cover with topsoil; Θ Seed the footprint area with an indigenous grass seed mix after topsoiling.	Week 46 - 52

CLOSURE SCHEDULE	
DECOMMISSIONING / CLOSURE ACTION	**TIMEFRAME**
MAINTENANCE AND AFTER CARE	
Θ Erosion Monitoring Θ Weeds and Invasive Plant Control	12 months duration after final closure of the mining area

6.6 IMPLEMENTATION AND RESPONSIBILITY OF CLOSURE PLAN

Implementation of the closure plan is ultimately the responsibility of the MR Holder. 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 MR Holder will appoint an Environmental Control Officer to oversee compliance of the rehabilitation/closure activities.

6.6.1 Site Management Responsibility List

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

6.6.2 Management of Information and Data

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

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

6.7 IDENTIFIED GAPS IN THE PLAN

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

6.8 RELINQUISHMENT CRITERIA FOR CLOSURE ACTIVITIES

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

1. that the topography has been sufficiently 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 mining area;
4. that there is no visible erosion across the area, or down-slope of it as a result of mining, and that no part of the area has been left unacceptably vulnerable to erosion;
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 Petra Quarry:

Table 10: Relinquishment criteria for closure activities.

RELINQUISHMENT CRITERIA FOR CLOSURE ACTIVITIES			
CATEGORY	**RELINQUISHMENT CRITERIA**	**INDICATORS**	**REPORTING REQUIREMENTS**
Removal of all unwanted equipment.	No visible man-made structures, that are not required by the landowner, should remain.	Closeout inspection by site management upon end of decommissioning phase.	Photographic evidence that infrastructure has been removed.
Soil erosion	Implementation of erosion control measures or the establishment of vegetation in denuded areas.	Engineered structures to control water flow	Proof in final closure report that required structures are in place and functional.

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

6.9 CLOSURE COST ESTIMATE

Financial provision, as required under Section 41 and Regulations 53 and 54 of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA), refers to the amount that must be set aside to rehabilitate environmental damage caused by mining operations. This provision covers both sudden or premature closure during the operational life of the project as well as final, planned closure. The financial provision must reflect the actual cost the Department would incur to rehabilitate the area should the holder of the right liquidate or abscond. Financial provision for environmental rehabilitation and mine closure is therefore an integral requirement of the MPRDA framework to ensure that mining does not leave a legacy of environmental degradation.

Refer to Appendix F of the 2025 EMPR for the most recent (2025) review of the mine's closure cost estimate. (*Note, this document is not a public document, and therefore not attached to the draft EMPR*).

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

The Final Rehabilitation, Decommissioning and Mine Closure Plan of Petra Quarry was revised and renewed in support of the EMPR amendment to be submitted to the DMRE for approval.

7. MONITORING, AUDITING AND REPORTING

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

Table 11: Monitoring, auditing and reporting requirements

MONITORING, AUDITING AND REPORTING REQUIREMENTS			
AUDIT	**RESPONSIBLE PERSON**	**FREQUENCY OF AUDIT**	**CLOSE OUT APPROACH**
LEGISLATED AUDITING AND REPORTING			
Environmental Auditing	**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 DMRE.	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 DMRE.	Should the review of the financial provision indicate a shortfall the holder of the right would increase the financial provision to meet the audited financial provision within 90 days from the date of the signature.

MONITORING, AUDITING AND REPORTING REQUIREMENTS			
AUDIT	**RESPONSIBLE PERSON**	**FREQUENCY OF AUDIT**	**CLOSE OUT APPROACH**
		MONITORING	
Dust Monitoring	Dust Monitoring Consultant	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.
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 always be available to employees.

7.1 SCHEDULE FOR REPORTING REQUIREMENTS

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

Table 12: Reporting requirements.

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

- Θ Environmental significance is a value judgement
- Θ The degree of environmental significance depends on the nature of the risk
- Θ The importance is rated in terms of both biophysical and socio-economic values
- Θ 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 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 that will 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 the purpose of 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 impact on the biophysical and socio-economic environment.

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

Table 13: Rating of severity used in the assessment of potential latent risks.

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

Determination of Duration

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

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

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

Determination of Extent/Spatial Scale

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

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

RATING	DESCRIPTION
1	Immediate, fully contained area
2	Surrounding area
3	Within Business Unit area of responsibility
4	Within the farm/neighbouring farm area
5	Regional, National, International

Determination of Overall Consequence

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

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

CONSEQUENCE	RATING
Severity	Example 4
Duration	Example 2
Extent	Example 4
SUBTOTAL	**10**
TOTAL CONSEQUENCE: (Subtotal divided by 3)	**3.3**

Determination of Likelihood

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

Determination of Frequency

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

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

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

Determination of Probability

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

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

RATING	DESCRIPTION
1	Almost never / almost impossible
2	Very seldom / highly unlikely
3	Infrequent / unlikely / seldom
4	Often / regularly / likely / possible
5	Daily / highly likely / definitely

Overall Likelihood

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

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

CONSEQUENCE	RATING
Frequency	Example 4
Probability	Example 2
SUBTOTAL	**6**
TOTAL LIKELIHOOD (Subtotal divided by 2)	**3**

Determination of Overall Environmental Significance

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

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

SIGNIFICANCE OR RISK	INSIGNIFICANT RISK (CC)	UNCERTAIN RISK (BB)	POTENTIAL SIGNIFICANT RISK (AA)
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 – 19.9

Qualitative description or magnitude of Environmental Significance

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

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

SIGNIFICANCE	AN INSIGNIFICANT RISK (CC)	A UNCERTAIN RISK (BB)	A POTENTIAL SIGNIFICANT RISK (AA)
Impact Magnitude	Impact is of very low order and therefore likely to have very little real effect. Acceptable.	Impact is of low order and therefore likely to have little real effect. Acceptable.	Impact is real and substantial in relation to other impacts. Pose a risk to the company. Unacceptable
Action Required	Maintain current management measures. Where possible improve.	Maintain current management measures. Implement monitoring and evaluate to determine potential increase in risk. Where possible improve	Improve management measures to reduce risk.

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

A potential Risk (aa) — Risks of a substantial order. Mitigation and / or remedial activity would be feasible but difficult, expensive, time-consuming or some combination of these.

An uncertain risk (bb) — Risk would be negligible. Almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap, and simple.

An insignificant risk (cc) — There would be very small to no risk.

8.1.2 Description of Latent Risks

Once adequately rehabilitated, the excavation will nevertheless behave as a sump and collect surface run-off after wet periods. The floor of the quarry may, therefore, reveal fluctuating water levels depending on rainfall patterns. Considering this, it is important to adequately block access to the excavation (soil berm / oversize rock in entrance) to prevent unauthorized access to humans (especially children) and domestic animals upon closure of the mine.

8.1.3 Results and Finding of Risk Assessment

Potential Impact: Safety risk posed by stagnant water in the excavation

Rating Prior To Mitigation: **Potential Significant Risk**

			Consequence			Likelihood	**Significance**
Severity	Duration	Extend		Probability	Frequency		
3	5	1	3	5	5	5	**15**

8.1.4 Changes to the Risk Assessment Results

It is proposed that access to the excavation must be blocked (soil berm / oversize rock in entrance) to prevent unauthorized access to humans (especially children) and domestic animals upon closure of the mine. Should this mitigation measure/management practice be implemented the significance of the risk can be reduced to an Insignificant risk.

Potential Impact: Safety risk posed by stagnant water in the excavation

Rating After Mitigation: **Insignificant Risk**

			Consequence			Likelihood	**Significance**
Severity	Duration	Extend		Probability	Frequency		
2	5	1	2.6	2	1	1.5	**3.9**

8.2 MANAGEMENT ACTIVITIES

Apart from restricting entrance to the excavation, the following additional management activities may be considered to prevent stagnant water from becoming a safety risk:

- Design and maintain diversion channels, berms, and drains to redirect stormwater away from the excavation.
- Erect clear warning signage near areas where water may accumulate temporarily.

8.3 COST ESTIMATE

If the entrance to the excavation is blocked during the decommissioning phase, as part of the rehabilitation of the mining area, no additional costs will be incurred as the MR Holder's own machinery will be employed and the oversize rock/unwanted soil from the mining area will be used.

8.4 MONITORING, AUDITING AND REPORTING REQUIREMENTS

The efficiency of the blockage/berm at the entrance to the excavation must be monitored for a 12-month duration after final closure of the mining area, and improvements must be implemented should shortcomings be identified.

9. CONCLUSION

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

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

10. SIGNATURE OF AUTHOR

NAME	SIGNATURE	DATE
Christine Fouché	*Christine Fouché*	24 July 2025

11. UNDERTAKING BY MINING RIGHT HOLDER

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

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

Signed at …….. on this ……day of ……2025……

FINAL DOCUMENT TO BE SIGNED

_____

Name:

Designation:

12. REFERENCES

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