



LEFATSE

Environmental Planning Services (PTY) Ltd

Environmental Impact, Risk Assessment and Management Report

Proposed rock quarry and associated activities on the farm
Mimosa Glen 885/9 (of 6), Magisterial District Bloemfontein,
Free State Province

July 2019

Reference: FS 30/5/1/3/2/10277 MP

Lefatse Environmental Planning Services (Pty) Ltd. (Reg no. 2016/047456/07)

BLOEMFONTEIN OFFICE

Hanri van Jaarsveld
Director
079 499 7999
hanri@lefatsemail.co.za
PO Box 11945, Universitas, 9321

HERMANUS OFFICE

Johann du Preez
Director
082 376 4404
johann@lefatsemail.co.za
Postnet Suite 208, Private Bag X16,
Hermanus, 7200
(Pr Sci Nat. 400271/07)

PRETORIA OFFICE

Frank van der Kooy
Project Manager
082 890 1918
frank@lefatsemail.co.za
PO Box 32497, Totiusdal, 0134
(Pr Sci Nat. 400126/00)

Environmental Impact, Risk Assessment and Management Report

EAP details

Lefatse EPS (Pty) Ltd
P.O. Box 11945
Universitas
Bloemfontein
9321

Contact: Mrs Hanri van Jaarsveld
Tel: 079 499 7999
Email: Hanri@lefatsemail.co.za

Client details

AMC Umsenge Quarry (Pty) Ltd
2 Venter Street
Bainsvlei
Bloemfontein
9310

Contact: Mr Zane Murray
Tel: 051 451 2604
Email: zane@africanmc.co.za

INDEX

1.	Project description	1
2.	Scope.....	3
3.	Details of the assessor	4
4.	Methodology.....	5
5.	Identified environmental impacts and risks.....	8
6.	Recommended environmental management and mitigation measures.....	29

List of Figures

Figure 1: Locality map.....	2
Figure 2: Proposed site plan	3

List of Tables

Table 1: Extent or spatial scale of impacts	6
Table 2: The intensity or nature of impacts	6
Table 3: The expected duration of impacts	6
Table 4: The mitigatory potential of impacts.....	6
Table 5: The acceptability of impacts	7
Table 6: The probability of the impact occurring.....	7
Table 7: The rating of impact magnitude and significance.....	7
Table 8: Assessment of the potential impacts expected in respect of the preferred locality and final site layout (without mitigation).....	11
Table 9: Assessment of the potential impacts expected in respect of the preferred locality and final site layout (with mitigation).....	15
Table 10: Significance of the potential impacts/risks expected in respect of the preferred locality and final site layout (without and with mitigation measures)	19
Table 11: Recommended environmental management/mitigation measures to be implemented	29

1. PROJECT DESCRIPTION

Lefatse Environmental Planning Services (Pty) Ltd (Lefatse EPS) was appointed to manage an application for Environmental Authorisation (EA) in terms of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998) and related regulations for a mining permit in terms of Section 27 of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act 28 of 2002).

The details of the application are as follow:

Applicant information:

Applicant: AMC Umsenge Quarry (Pty) Ltd. (Registration no. 2017/341425/07)

Ref. No. FS 30/5/1/3/2/10277 MP

Extent: Approximately 4.9 ha

Contact details:

Mr. Zane Murray

2 Venter Street

Bainsvlei

Bloemfontein

9310

Email: zane@africanmc.co.za

Tel: 051 451 2604

Property information:

Portion 9 (of 6) of the farm Mimosa Glen 885 situated in the Magisterial District of Bloemfontein, Free State Province (Figure 1: Locality map). [F00300000000088500009]

Mineral type:

Dolerite (Stone aggregate)

The previous mining permit of 4.9 ha on a portion of the farm Mimosa Glen 885/9 under Mr. P.G. van der Sandt has lapsed. There is an agreement between AMC Umsenge (Pty) Ltd. (also an associated company to the new landowner, i.e. AMC Property (Pty) Ltd.) and Mr. Van der Sandt that the current environmental liabilities will be transferred to AMC Umsenge Quarry with this mining permit application for the mining of dolerite submitted to the Department of Mineral Resources (DMR) by AMC Umsenge Quarry (Pty) Ltd.

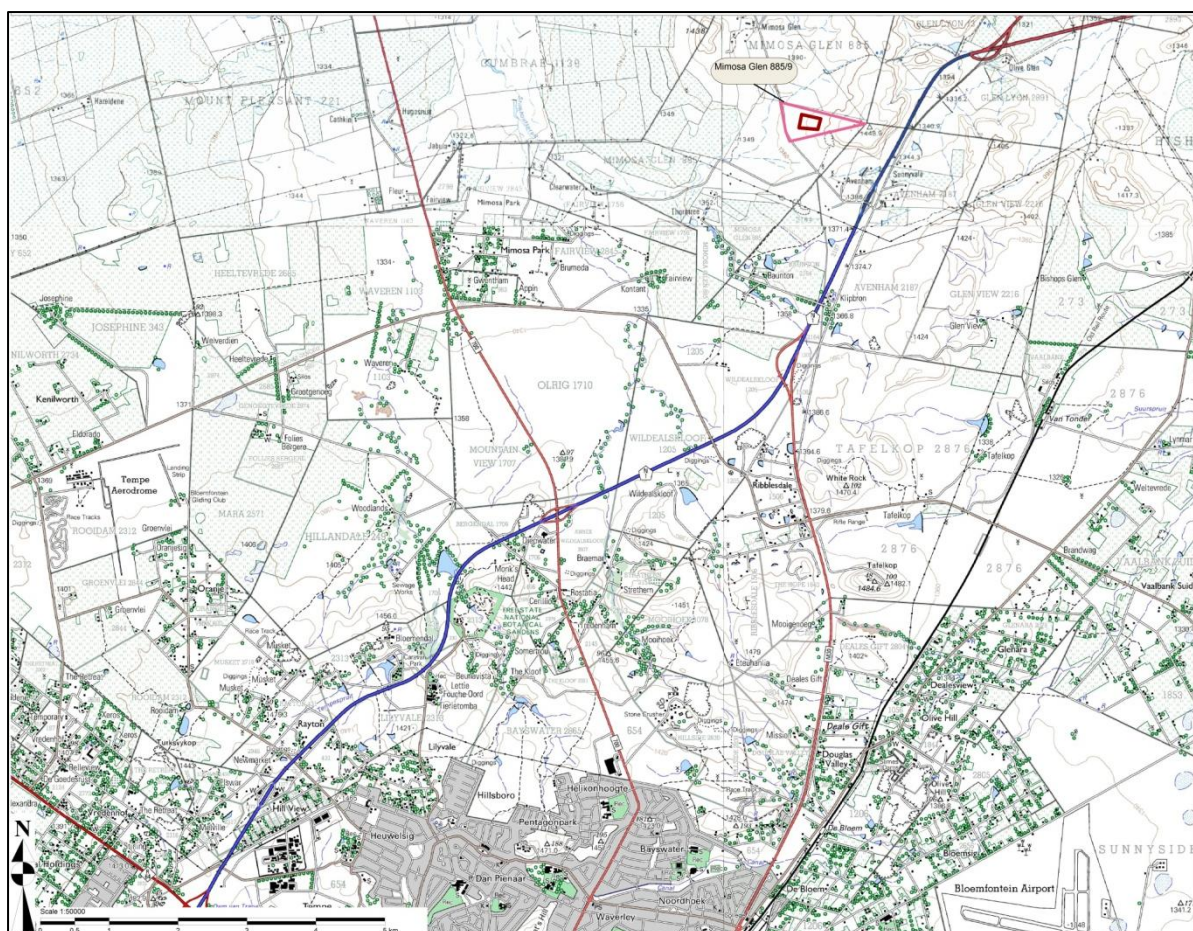


Figure 1: Locality map

Activities on site will mainly include the following (Figure 2: Proposed site plan):

- Transfer of the current environmental liabilities as at the time of lapsing of the previous mining permit through also applying for Closure of the previous permit under Mr. P.G. van der Sandt.
- Site establishment, including establishment of mining equipment and associated infrastructure for mining of dolerite (stone aggregate) during the Operational Phase, e.g. crusher; screening plant; offices.
- Occasional blasting to loosen material.
- Excavation, crushing and screening.
- Conveying of product to stockpiles.
- Loading and hauling of product.
- Storage of approximately 10 000 litres diesel for use in machinery.
- Abstraction of groundwater from a borehole.
- Storage of water in a reservoir on site.
- Dust suppression through means of water spraying.
- On-site training of employees on equipment.
- Continuous rehabilitation of worked-out areas.

- Continuous environmental management throughout all the phases of the operation.

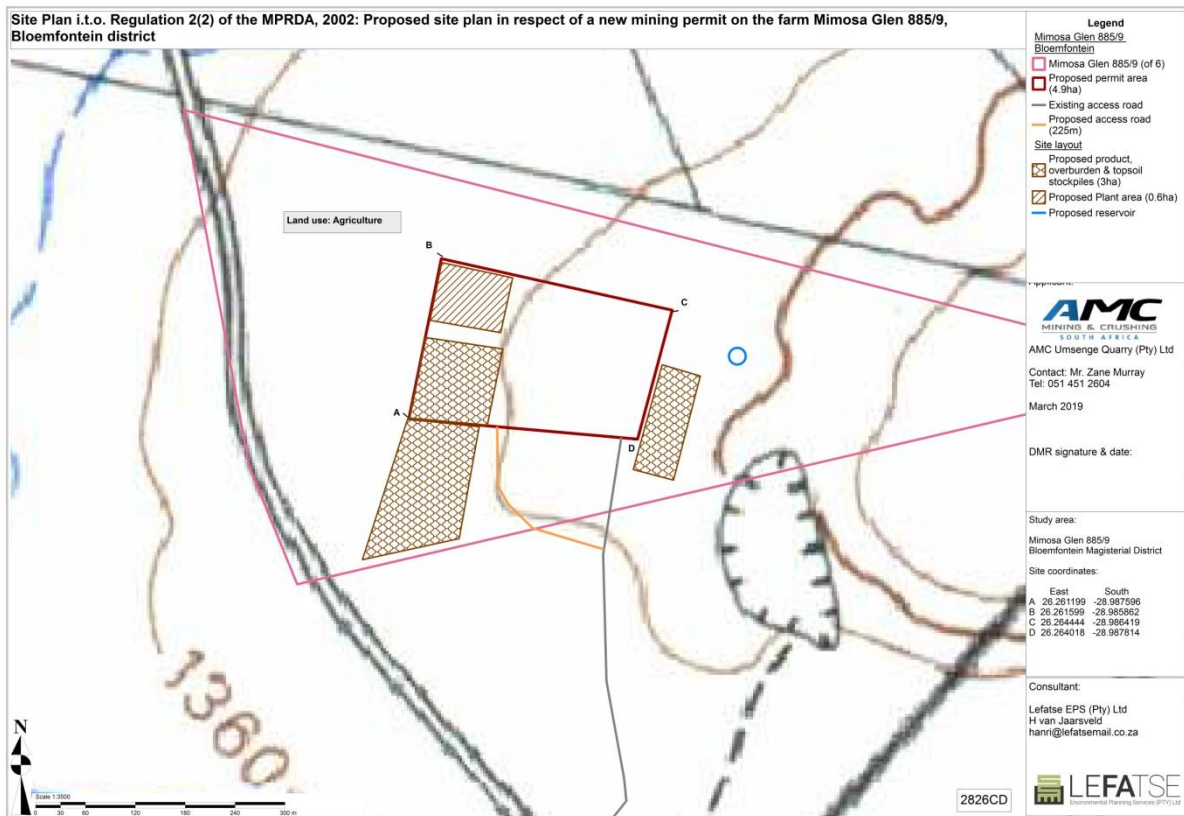


Figure 2: Proposed site plan

2. SCOPE

A Basic Assessment process in terms of regulations 19 and 20 of the NEMA Environmental Impact Assessment (EIA) Regulations, 2014 as amended was commenced with as part of the EA application for the following listed activities:

Activity	Activity description
Listing Notice 1, No. 21 of GNR 327	<i>Any activity including the operation of that activity which requires a mining permit in terms of Section 27 of the MPRDA, 2002 (Act 28 of 2002), including (a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or (b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing; but excluding the secondary</i>

	<i>processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Listing Notice 2 applies.</i>
Listing Notice 1, No. 27 of GNR 327	<i>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.</i>

There is an existing Water Use Authorisation for the abstraction of groundwater from a borehole for use for dust suppression at the operation. The details of the Water Use holder will be changed to AMC Umsenge (Pty) Ltd. The abstraction of water as well as the storage of water in the reservoir has also been assessed within this report.

The purpose of this Environmental Impact Assessment/Risk and Management report is to identify and assess the significance of the potential impacts expected to be associated with the proposed operation as well as to develop environmental management/mitigation measures to be implemented to prevent and/or limit these expected impacts.

3. DETAILS OF THE ASSESSOR

The details of the person responsible for the assessment and preparation of this report are as follow:

Environmental Assessment Practitioner:

Mrs. Hanri van Jaarsveld

Registration/affiliation to professional body:

Member of the International Association for Impact Assessment South Africa (IAIAAsa)

Contact details:

Lefatse Environmental Planning Services (Pty) Ltd

PO Box 11945

Universitas

Bloemfontein

9321

Email: Hanri@lefatsemail.co.za

Tel: 079 499 7999

Qualifications of the practitioner:

B.Sc. Microbiology and Zoology

B.Sc. Honours in Zoology

Magister in Environmental Management

Summary of the practitioner's expertise:

H van Jaarsveld has been involved in environmental management since 2007. Personal experience includes amongst other: Coordination of environmental courses presented at the Centre for Environmental Management, UFS; Project management; Applications for Environmental Authorisation in terms of NEMA, 1998 (Act 107 of 1998) and related regulations, including waste licences and atmospheric emission licenses; Application of Integrated Water Use Licenses in terms of the NWA, 1998 (Act 36 of 1998); Environmental compliance auditing on especially road construction projects and mining related operations.

4. METHODOLOGY USED IN DETERMINING AND RANKING THE NATURE, SIGNIFICANCE, CONSEQUENCES, EXTENT, DURATION AND PROBABILITY OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

The criteria for determining impact significance as specified in the "DEAT (2002) Impact Significance, Integrated Environmental Management, Information Series 5, Department of Environmental Affairs and Tourism (DEAT)" was adopted to determine and rank the potential impacts expected to be associated with the proposed operation. Issues raised by Interested and/or Affected Parties (I&APs) during the consultation process were also assessed.

The criteria is based on the a) Extent or spatial scale of the impact; b) Intensity or nature of the impact; c) Expected duration of the impact; d) Mitigatory potential of impacts; e) Acceptability of impacts; f) The probability of the impacts occurring; g) The status of the impact, i.e. positive, negative or neutral; and h) Identify the specific legal and permit requirements relevant to the project. All of these are used to give a significance rating for each identified impact (Table 7). The locality of the study area and distance of the proposed project site from potential affected landowners were also considered during the rating of the significance.

The rating for the extent of an impact is related to the area that is likely to be affected by the impact, e.g. limited to the site or local area (Table 1).

Table 1: Extent or spatial scale of impacts

Rating	Description
High	Regional / National / International scale
Medium	Beyond site boundary
Low	Within site boundary (i.e. mining permit area)

The intensity of an impact is rated to be high, medium or low and is based on legal standards and information from specialist studies as far as possible (Table 2). Where no legal standard is available, best practice is considered.

Table 2: The intensity or nature of impacts

Rating	Description
High	Disturbance of pristine areas that have important conservation value. / Destruction of rare or endangered species.
Medium	Disturbance of areas that have potential conservation value or are of use as resources. / Complete change in species occurrence or variety.
Low	Disturbance of degraded areas, which have little conservation value. / Minor change in species occurrence or variety.

It is determined what the expected duration of the impact occurring would be, i.e. short term, medium term, long term or considered to be permanent (Table 3).

Table 3: The expected duration of impacts

Rating	Description
High	Permanent / Long term (More than 15 years)
Medium	Medium term (5 – 15 years)
Low	Short term (0 – 5 years)

Based on experience and known results from environmental management and/or mitigation measures on similar projects, the mitigatory potential of an impact is estimated to be low, medium or high (Table 4). Also refer to Table 9 in this report for the expected significance rating of each impact after management measures have been implemented to limit and/or prevent the expected impact or the extent thereof.

Table 4: The mitigatory potential of impacts

Rating	Description
High	High potential to mitigate negative impacts to the level of insignificant effects.
Medium	Potential to mitigate negative impacts. However, the implementation of mitigation measures may still not prevent some negative effects.

Rating	Description
Low	Little or no mechanism to mitigate negative impacts.

Although there are criteria and standards in terms of the acceptability level of impacts that are emissions-based or that relate to the receiving environment, e.g. air quality, water quality or noise, it often depends on the stakeholders and I&APs directly affected by the proposed project (DEAT, 2002). The ratings proposed for this impact assessment criteria are indicated in Table 5.

Table 5: The acceptability of impacts

Rating	Description
High (unacceptable)	Redesign project to remove or avoid impact.
Medium (Manageable)	With regulatory controls. / With project proponent's commitments.
Low (Acceptable)	No risk

The degree of certainty of the impact actually occurring is described to be unlikely, likely, highly likely or definite (i.e. impact will occur regardless of prevention measures) (Table 6).

Table 6: The probability of the impact occurring

Rating	Description
Definite	More than 90% sure of a particular fact. Substantial supportive data exist to verify the assessment.
Highly likely	Over 70% sure of a particular fact or of the likelihood of that impact occurring.
Likely	Possible: Only over 40% sure of a particular fact or of the likelihood of an impact occurring.
Unlikely	Less than 40% sure of a particular fact or the likelihood of an impact occurring.

All the criteria described, the environmental features as a whole together with the expected impact on the local community are considered in rating the significance of an impact (Table 7).

Table 7: The rating of impact magnitude and significance

Magnitude / Significance rating	Description
High	Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or some combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt. In the case of beneficial impacts, the impact is of a substantial order within the bounds of

Magnitude / Significance rating	Description
	impacts that could occur.
Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly easily possible. Social, cultural and economic activities of communities are changed, but can be continued (albeit in a different form). Modification of the project design or alternative action may be required. In the case of beneficial impacts, other means of achieving this benefit are about equal in time, cost and effort.
Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural and economic activities of communities can continue unchanged. In the case of beneficial impacts, alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming.
No impact	Zero impact

5. IDENTIFIED ENVIRONMENTAL IMPACTS AND RISKS ASSOCIATED WITH THE PROPOSED PROJECT

The potential impacts were identified through a desktop study of the study area and a site assessment by the EAP, Ecological and Wetland Assessment, Phase 1 Palaeontological and Archaeological Assessment, Desktop Palaeontological Impact Assessment and Protocol for Finds, as well as involvement from identified I&APs and stakeholders. This assessment is also based on the following assumptions, uncertainties and knowledge gaps/limitations:

- During the assessment and development of the management measures, it was assumed that the information provided by the applicant, input from I&APs and stakeholders and input from the specialists were true, correct to the best of their knowledge and unbiased.
- The previous mining permit on the property is under a different permit holder than the applicant for this proposed operation. This permit has lapsed in November 2018 and the permit holder did not submit an application for a renewal thereof. The environmental liabilities will be transferred to the new applicant as the planned end land use is mining on the footprint of the previous mining permit.
- Information from the Phase 1 Palaeontological and Archaeological Assessment (2015) conducted as part of the Environmental Authorisation for the previous mining permit on the affected property was used as baseline heritage information for this report, as the study was also for the same study area and mining permit area applied for with this new

application. A desktop Palaeontological Impact Assessment and Protocol for Finds (2019) has been undertaken for the proposed extension of clearance for offices and stockpiles.

- The annual volume of dolerite that will be excavated during the proposed operation was calculated based on projected sales and estimated available resource. An estimate was calculated within the Financial and Technical Capability report.
- i) The potential impacts/risks expected to be associated with the proposed dolerite quarry include the following:
- Clearance of vegetation;
 - Destruction of protected plant species;
 - Habitat loss and effect on the general biodiversity;
 - Establishment of alien vegetation;
 - Erosion and loss of topsoil;
 - Loss of agriculture potential due to a change in land use;
 - Temporary disturbance to ecosystem function;
 - Change in topography and drainage lines and back disturbance of seasonal streams as a result;
 - Slope instability of excavated areas;
 - Impact on surface water and groundwater quality (e.g. spillage of potential dangerous substances);
 - Impact on surface- and groundwater quantity (e.g. abstraction);
 - Pollution to the surrounding environment if waste is not managed;
 - Dust generation;
 - Elevated noise levels mainly generated by moving mining equipment/vehicles, drilling, blasting as well as the mechanical actions by the crusher and screens;
 - Health and safety risk to employees on site and people entering the mining area;
 - Safety risk to neighbours due to an increase in people in the area;
 - Degradation of the road due to an increase in heavy vehicles on the access road;
 - Potential damage to infrastructure as a result of blasting events;
 - Impact on the general aesthetics of the area and immediate visual impact;
 - Risk of veld fires;
 - Positive impact on employment opportunities and skills development; and
 - Positive impact of economic development.

ii) The main concerns raised by I&APs and stakeholders during consultation to date were as follow:

- Excessive dust on pastures.
- Risks of veld fires and noise generation from blasting events.
- Potential damage to houses and existing boreholes as a result of blasting events.
- The possibility of unwanted dumping and scavenging along the access road resulting in potential safety risks to the passing neighbours.
- Maintenance of the existing access road to neighbouring farms.
- Visual impact of an open mine.

Refer to Tables 8 - 10 of this document for an assessment of each impact expected to be associated with the proposed operation in respect of the preferred locality and final site layout without mitigation and with mitigation.

Table 8: Assessment of the potential impacts expected in respect of the preferred locality and final site layout (without mitigation)

Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Site establishment (Clearance of vegetation; establishment of equipment; access road; reservoir; etc.)	Clearance of vegetation	Negative	Low	Low	Low	Definite	Manageable	Medium	High
	Destruction of protected plant species	Negative	Low	Medium	Medium	Highly likely	Manageable	Medium	Medium
	Establishment of alien vegetation	Negative	Medium	Low	Medium	Highly likely	Manageable	Medium	High
	Habitat loss and effect on the general biodiversity	Negative	Medium	Low	Medium	Definite	Manageable	Medium	Medium
	Erosion	Negative	Medium	Low	Low	Highly likely	Manageable	Low	High
	Loss of topsoil	Negative	Medium	Low	Low	Highly likely	Manageable	Low	High
	Visual scarring and impact on the aesthetics of the area	Negative	Medium	Low	Low	Definite	Manageable	Medium	Medium
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	Medium
	Change in land use (Loss of agriculture potential)	Negative	Low	Low	Medium	Definite	Acceptable	Medium	Medium
	Destruction of objects or artefacts of importance	Negative	Low	Low	High	Likely	Unacceptable	Medium	Low
Excavation / Open void	Local impression in topography	Negative	Low	Low	High	Definite	Manageable	Medium	Low
	Clearance of vegetation	Negative	Low	Low	Medium	Definite	Manageable	Medium	Medium
	Temporary disturbance to ecosystem function	Negative	Medium	Low	Medium	Highly likely	Manageable	Medium	Medium
	Slope instability	Negative	Low	Low	Medium	Highly likely	Manageable	Medium	Medium
	Change in surface water drainage	Negative	Medium	Low	High	Highly likely	Manageable	Medium	Medium
	Erosion	Negative	Medium	Low	Medium	Highly likely	Manageable	Medium	High
	Visual scarring	Negative	Medium	Low	High	Highly likely	Manageable	Medium	Low

Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Excavation / Open void	Dust generation	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	High
	Change in land use (Loss of agriculture potential)	Negative	Low	Low	Medium	Definite	Acceptable	Medium	Medium
	Destruction of objects or artefacts of importance	Negative	Low	Low	High	Likely	Unacceptable	Medium	Low
Drilling & blasting	Dust generation	Negative	Medium	Low	Low	Definite	Manageable	Medium	Medium
	Fly rock	Negative	Medium	Low	Low	Highly likely	Manageable	Medium	Medium
	Elevated noise levels	Negative	Medium	Low	Low	Definite	Manageable	Medium	Medium
	Fire risk	Negative	Medium	Low	Low	Likely	Manageable	Medium	Medium
	Damage to infrastructure & boreholes	Negative	Medium	Low	High	Likely	Unacceptable	Medium	Medium
	Disruption in the local geology	Negative	Medium	Low	High	Likely	Manageable	Medium	Low
Loading & hauling	Dust generation	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	Medium
	Deterioration of the gravel access road	Negative	Medium	Low	Low	Highly likely	Manageable	Medium	High
Crushing & screening	Dust generation	Negative	Medium	Low	Low	Highly likely	Manageable	Medium	Medium
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	Medium
	Visual scarring	Negative	Medium	Low	Low	Highly likely	Manageable	Medium	Medium
Stockpiling	Dust generation	Negative	Medium	Low	Low	Likely	Manageable	Low	High
	Visual scarring	Negative	Medium	Low	Low	Highly likely	Manageable	Medium	Medium
	Change in surface water drainage	Negative	Medium	Low	Low	Likely	Manageable	Medium	High
	Loss of topsoil	Negative	Low	Low	Low	Likely	Manageable	Low	High

Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Stockpiling	Establishment of alien vegetation	Negative	Low	Low	Medium	Highly likely	Manageable	Medium	High
Water use: Abstraction of groundwater from a borehole	Impact on the groundwater quantity	Negative	Medium	Medium	Low	Highly likely	Manageable	Medium	Medium
	Disturbance to local geology due to drilling	Negative	Low	Low	High	Definite	Acceptable	Low	Medium
Water use: Storage of water in a reservoir	Visual scarring	Negative	Medium	Low	Medium	Highly likely	Acceptable	Low	Medium
	Change in land use (Loss of agriculture potential)	Negative	Low	Low	Medium	Likely	Acceptable	Low	High
Material storage (e.g. fuel, oil, gas) and waste disposal (including sewage)	Soil contamination from spillages and waste disposal	Negative	Low	Low	Medium	Likely	Manageable	Medium	High
	Water pollution due to spillages and waste disposal	Negative	Medium	Medium	Medium	Likely	Manageable	Medium	Medium
	Littering	Negative	Medium	Low	Low	Likely	Manageable	Medium	High
	Fire risk	Negative	Medium	Low	Low	Likely	Manageable	Medium	Medium
General operational activities in respect of I&APs and employees	Impact on the general aesthetics of the area	Negative	Medium	Low	Medium	Definite	Manageable	Medium	Medium
	Risk of injury to people entering the operational area	Negative	Low	Low	Low	Likely	Manageable	Medium	Medium
	Risk of injury to employees working with machinery/equipment on site	Negative	Low	Low	Low	Likely	Manageable	Medium	Medium
	Illegal dumping & scavenging potentially resulting in safety risks to passing neighbours	Negative	Medium	Low	Low	Likely	Manageable	Medium	Medium
	Job creation & skills upliftment	Positive	Medium	Low	Low	Definite	Acceptable	Medium	-
	Economic development in the region	Positive	Medium	Low	Low	Highly likely	Acceptable	Medium	-

Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Rehabilitation (e.g. removal of equipment, reshaping & re-vegetation of disturbed areas, etc.)	Soil contamination from spillages and waste disposal	Negative	Low	Low	Medium	Likely	Manageable	Medium	High
	Water pollution due to spillages and waste disposal	Negative	Medium	Medium	Medium	Likely	Manageable	Medium	Medium
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	Medium
	Change in surface water drainage	Positive	Medium	Low	Medium	Highly likely	Acceptable	Medium	-
	Erosion & loss of topsoil	Negative	Medium	Low	Low	Highly likely	Manageable	Medium	High
	Establishment of alien vegetation	Negative	Medium	Low	Medium	Highly likely	Manageable	Medium	High
	Establishment of a self-sustaining ecosystem	Positive	Low	Low	High	Likely	Acceptable	Medium	-
Cumulative impacts considering other activities within 1km	Dust generation	Negative	Medium	Low	Low	Highly likely	Manageable	Medium	Medium
	Visual scarring	Negative	Medium	Low	High	Highly likely	Manageable	Medium	Low
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	High
	Change in land use (Loss of agriculture potential)	Negative	Low	Medium	Medium	Likely	Manageable	Medium	Medium
	Change in surface water drainage	Negative	Medium	Medium	Medium	Likely	Manageable	Medium	Medium
	Habitat loss and effect on the general biodiversity	Negative	Medium	Medium	Medium	Medium	Likely	Manageable	Medium

Table 9: Assessment of the potential impacts expected in respect of the preferred locality and final site layout (with mitigation)

Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Site establishment (Clearance of vegetation; establishment of equipment; access road; reservoir; etc.)	Clearance of vegetation	Negative	Low	Low	Low	Definite	Manageable	Low	High
	Destruction of protected plant species	Negative	Low	Medium	Low	Likely	Manageable	Low	Medium
	Establishment of alien vegetation	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Habitat loss and effect on the general biodiversity	Negative	Low	Low	Medium	Definite	Manageable	Medium	Medium
	Erosion	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Loss of topsoil	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Visual scarring and impact on the aesthetics of the area	Negative	Medium	Low	Low	Highly likely	Manageable	Low	Medium
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	Medium
	Change in land use (Loss of agriculture potential)	Negative	Low	Low	Medium	Definite	Acceptable	Low	Medium
	Destruction of objects or artefacts of importance	Negative	Low	Low	High	Unlikely	Manageable	Low	Low
Excavation / Open void	Local impression in topography	Negative	Low	Low	High	Definite	Manageable	Medium	Low
	Clearance of vegetation	Negative	Low	Low	Medium	Definite	Manageable	Medium	Medium
	Temporary disturbance to ecosystem function	Negative	Low	Low	Low	Highly likely	Manageable	Low	Medium
	Slope instability	Negative	Low	Low	Medium	Likely	Manageable	Low	Medium
	Change in surface water drainage	Negative	Low	Low	Medium	Highly likely	Manageable	Low	Medium
	Erosion	Negative	Low	Low	Medium	Likely	Manageable	Low	High
	Visual scarring	Negative	Medium	Low	High	Highly likely	Manageable	Medium	Low

Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Excavation / Open void	Dust generation	Negative	Low	Low	Low	Likely	Acceptable	Low	High
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	High
	Change in land use (Loss of agriculture potential)	Negative	Low	Low	Medium	Definite	Acceptable	Low	Medium
	Destruction of objects or artefacts of importance	Negative	Low	Low	High	Unlikely	Manageable	Low	Low
Drilling & blasting	Dust generation	Negative	Medium	Low	Low	Definite	Manageable	Medium	Medium
	Fly rock	Negative	Medium	Low	Low	Likely	Manageable	Low	Medium
	Elevated noise levels	Negative	Medium	Low	Low	Definite	Manageable	Medium	Medium
	Fire risk	Negative	Medium	Low	Low	Unlikely	Manageable	Low	Medium
	Damage to infrastructure & boreholes	Negative	Medium	Low	High	Unlikely	Manageable	Low	Medium
	Disruption in the local geology	Negative	Medium	Low	High	Likely	Manageable	Medium	Low
Loading & hauling	Dust generation	Negative	Low	Low	Low	Likely	Acceptable	Low	High
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	Medium
	Deterioration of the gravel access road	Negative	Medium	Low	Low	Likely	Manageable	Low	High
Crushing & screening	Dust generation	Negative	Medium	Low	Low	Likely	Manageable	Low	Medium
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	Medium
	Visual scarring	Negative	Medium	Low	Low	Likely	Manageable	Low	Medium
Stockpiling	Dust generation	Negative	Low	Low	Low	Likely	Acceptable	Low	High
	Visual scarring	Negative	Medium	Low	Low	Likely	Manageable	Medium	High
	Change in surface water drainage	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Loss of topsoil	Negative	Low	Low	Low	Likely	Manageable	Low	High

Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Stockpiling	Establishment of alien vegetation	Negative	Low	Low	Low	Likely	Manageable	Low	High
Water use: Abstraction of groundwater from a borehole	Impact on the groundwater quantity	Negative	Low	Medium	Low	Likely	Manageable	Low	Medium
	Disturbance to local geology due to drilling	Negative	Low	Low	High	Definite	Acceptable	Low	Medium
Water use: Storage of water in a reservoir	Visual scarring	Negative	Medium	Low	Medium	Highly likely	Acceptable	Low	Medium
	Change in land use (Loss of agriculture potential)	Negative	Low	Low	Medium	Unlikely	Acceptable	Low	High
Material storage (e.g. fuel, oil, gas) and waste disposal (including sewage)	Soil contamination from spillages and waste disposal	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Water pollution due to spillages and waste disposal	Negative	Low	Medium	Low	Likely	Manageable	Low	Medium
	Littering	Negative	Low	Low	Low	Unlikely	Manageable	Low	High
	Fire risk	Negative	Medium	Low	Low	Unlikely	Manageable	Low	Medium
General operational activities in respect of I&APs and employees	Impact on the general aesthetics of the area	Negative	Medium	Low	Low	Highly likely	Manageable	Medium	Medium
	Risk of injury to people entering the operational area	Negative	Low	Low	Low	Unlikely	Manageable	Low	Medium
	Risk of injury to employees working with machinery/equipment on site	Negative	Low	Low	Low	Likely	Manageable	Medium	Medium
	Illegal dumping & scavenging potentially resulting in safety risks to passing neighbours	Negative	Medium	Low	Low	Likely	Manageable	Medium	Medium
	Job creation & skills upliftment	Positive	Medium	Low	Low	Definite	Acceptable	Medium	-
	Economic development in the region	Positive	Medium	Low	Low	Highly likely	Acceptable	Medium	-

Name of activity	Potential impact	Positive / Negative	Extent	Intensity / nature	Duration	Probability	Level of acceptability	Significance	Mitigatory potential (Reversibility)
Rehabilitation (e.g. removal of equipment, reshaping & re-vegetation of disturbed areas, etc.)	Soil contamination from spillages and waste disposal	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Water pollution due to spillages and waste disposal	Negative	Low	Medium	Low	Likely	Manageable	Low	Medium
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	Medium
	Change in surface water drainage	Positive	Medium	Low	Medium	Highly likely	Acceptable	Medium	-
	Erosion & loss of topsoil	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Establishment of alien vegetation	Negative	Low	Low	Low	Likely	Manageable	Low	High
	Establishment of a self-sustaining ecosystem	Positive	Low	Low	High	Highly likely	Acceptable	Medium	-
Cumulative impacts considering other activities within 1km	Dust generation	Negative	Medium	Low	Low	Likely	Acceptable	Low	High
	Visual scarring	Negative	Medium	Low	High	Likely	Manageable	Medium	Low
	Elevated noise levels	Negative	Medium	Low	Low	Likely	Acceptable	Low	High
	Change in land use (Loss of agriculture potential)	Negative	Low	Medium	Medium	Likely	Manageable	Low	Medium
	Change in surface water drainage	Negative	Medium	Medium	Medium	Likely	Manageable	Low	Medium
	Habitat loss and effect on the general biodiversity	Negative	Medium	Medium	Medium	Medium	Likely	Manageable	Medium

Table 10: Significance of the potential impacts/risks expected in respect of the preferred locality and final site layout (without and with mitigation measures)

Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Site establishment (Clearance of vegetation; establishment of equipment; access road; reservoir; etc.)	Clearance of vegetation	Aesthetics; Land use; Vegetation; Biodiversity	Commissioning	Medium	Avoid through site locality & layout; Remedy through rehabilitation; Limit footprint	Low
	Destruction of protected plant species	Vegetation; Biodiversity; Ecosystem function	Commissioning	Medium	Avoid through site locality & layout; Remedy through offsetting; Limit through search and rescue of individual plants; Avoid by relocating plants where possible; Limit footprint	Low
	Establishment of alien vegetation	Vegetation; Biodiversity; Ecosystem function	Commissioning; Operational	Medium	Remedy through rehabilitation; Limit footprint; Monitor establishment of invasive plants; Control through management plan	Low
	Habitat loss and effect on the general biodiversity	Vegetation; Fauna; Biodiversity	Commissioning; Operational	Medium	Limit through site locality & layout; Remedy through rehabilitation; Remedy through offsetting; Limit footprint	Medium
	Erosion	Aesthetics; Land use; Water quality; Soil	Commissioning; Operational	Low	Remedy through rehabilitation; Limit through site locality & layout; Limit footprint; Monitor occurrence of erosion and extent thereof; Control through storm water control and erosion measures	Low

Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Site establishment (Clearance of vegetation; establishment of equipment; access road; reservoir; etc.)	Loss of topsoil	Soil; Land use	Commissioning	Low	Limit through site locality & layout; Limit footprint; Control through appropriate topsoil stockpiling; Control through storm water control and erosion measures; Monitor occurrence of erosion and extent thereof; Remedy through rehabilitation	Low
	Visual scarring and impact on the aesthetics of the area	Aesthetics; Visual	Commissioning; Operational	Medium	Remedy through rehabilitation; Limit footprint; Limit through locality and site layout; Limit by creating visual barriers, e.g. planting of high trees; Limit with good house keeping	Low
	Elevated noise levels	Noise; I&APs; Health and Safety	Commissioning	Low	Control through operational procedures (including working hours)	Low
	Change in land use (Loss of agricultural potential)	Land use	Commissioning; Operational	Medium	Limit through site locality & layout; Remedy through rehabilitation; Limit footprint	Low
	Destruction of objects or artefacts of importance	Heritage; I&APs	Commissioning	Medium	Avoid through site locality & layout informed by Heritage Assessments (2015); Limit by implementing the "Chance Find Protocol" (2019); Create awareness with employees; Limit footprint	Low
Excavation / Open void	Local impression in topography	Topography; Land use	Operational; Closure	Medium	Control through operational procedures; Limit footprint; Remedy through landscaping and concurrent rehabilitation	Medium

Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Excavation / Open void	Clearance of vegetation	Aesthetics; Land use; Vegetation; Biodiversity	Operational; Closure	Medium	Control through operational procedures; Remedy through rehabilitation; Limit footprint	Medium
	Temporary disturbance to ecosystem function	Ecosystem function; Biodiversity; Land use	Operational; Decommissioning	Medium	Control through operational procedures; Remedy through rehabilitation; Limit footprint	Low
	Slope instability	Topography; Land use; Health & Safety	Operational; Decommissioning; Closure	Medium	Control through operational procedures; Remedy through concurrent rehabilitation; Control through slope and bench management	Low
	Change in surface water drainage	Natural flow path; Water quantity; Ecosystem function	Operational; Decommissioning; Closure	Medium	Control through operational procedures; Remedy through concurrent rehabilitation; Control through slope and bench management; Control through storm water management	Low
	Erosion	Soil; Vegetation	Operational; Decommissioning; Closure	Medium	Remedy through concurrent rehabilitation; Control through slope management; Control through storm water management; Avoid through appropriate topsoil stockpiling; Control through monitoring	Low
	Visual scarring	Aesthetics; Visual	Operational; Decommissioning; Closure	Medium	Control through operational procedures; Remedy through concurrent rehabilitation; Limit through site layout and footprint; Limit by visual barriers, e.g. high trees	Medium

Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Excavation / Open void	Dust generation	Air quality; I&APs	Operational; Decommissioning	Low	Control through operational procedures; Control through monitoring & dust suppression measures; Limit through concurrent rehabilitation	Low
	Elevated noise levels	Noise; I&APs	Operational; Decommissioning	Low	Control through operational procedures (including working hours); Limit through noise control & well functioning machinery	Low
	Change in land use (Loss of agriculture potential)	Land use	Operational; Decommissioning; Closure	Medium	Limit through site locality & layout; Remedy through rehabilitation; Limit footprint	Low
	Destruction of objects or artefacts of importance	Heritage; I&APs	Operational	Medium	Avoid through site locality & layout informed by Heritage Assessments (2015); Limit by implementing the "Chance Find Protocol" (2019); Create awareness with employees; Limit footprint	Low
Drilling & blasting	Dust generation	Air quality; I&APs	Operational	Medium	Limit through blasting procedures; Control through monitoring & dust control measures	Medium
	Fly rock	Health & Safety; I&APs	Operational	Medium	Limit through blasting procedures; Limit risks through communication to I&APs & clearance of employees from site; Remedy through clearance of affected areas	Low
	Elevated noise levels	Noise; I&APs	Operational	Medium	Limit through blasting procedures; Limit risks through communication to I&APs	Medium

Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Drilling & blasting	Fire risk	Health & Safety; I&APs; Biodiversity	Operational	Medium	Avoid through blast control measures & procedures	Low
	Damage to infrastructure & boreholes	Infrastructure; I&APs	Operational	Medium	Avoid through blast control measures & procedures; Control through monitoring	Low
	Disruption in the local geology	Geology	Operational	Medium	Avoid through blast control measures & procedures; Control through monitoring	Medium
Loading & hauling	Dust generation	Air quality; I&APs	Operational	Low	Control through operational procedures; Limit through dust control measures; Control through monitoring	Low
	Elevated noise levels	Noise; I&APs	Operational	Low	Control through operational procedures (including working hours); Limit through noise control & well functioning machinery	Low
	Deterioration of the gravel access road	Infrastructure; I&APs; Road safety	Operational; Decommissioning	Medium	Remedy through maintenance of the road; Control through speed control & visual checks (monitoring)	Low
Crushing & screening	Dust generation	Air quality; I&APs	Operational	Medium	Control through operational procedures; Control through dust control and monitoring;	Low
	Elevated noise levels	Noise; I&APs	Operational	Low	Control through operational procedures (including working hours); Limit through noise control & well functioning machinery	Low
	Visual scarring	Aesthetics; Visual	Operational; Decommissioning	Medium	Remedy through removal of equipment; Remedy through rehabilitation; Limit through site layout	Low

Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Stockpiling	Dust generation	Air quality; I&APs	Operational; Decommissioning	Low	Control through operational procedures; Control through dust control & monitoring; Remedy through rehabilitation	Low
	Visual scarring	Aesthetics; Visual	Operational; Decommissioning	Medium	Remedy through rehabilitation; Limit through site layout; Limit by creating visual barriers, e.g. planting of high trees	Medium
	Change in surface water drainage	Natural flow path; Water quantity; Ecosystem function	Operational; Decommissioning	Medium	Control through storm water controls; Limit through site layout; Remedy through rehabilitation	Low
	Loss of topsoil	Soil; Land use	Operational; Decommissioning	Low	Control through appropriate topsoil stockpiling; Control through storm water control; Control through erosion control and monitoring	Low
	Establishment of alien vegetation	Vegetation; Biodiversity; Ecosystem functioning	Operational; Decommissioning	Medium	Remedy through rehabilitation; Control through monitoring establishment of invasive vegetation; Control through implementation of a weed management plan	Low
Water use: Abstraction of groundwater from a borehole	Impact on the groundwater quantity	Water quantity; I&APs; Water reserve	Operational	Medium	Control through operational procedures; Control through monitoring water use; Limit volumes to minimum required	Low
	Disturbance to local geology due to drilling	Geology	Commissioning; Operational; Decommissioning; Closure	Low	Limit through drilling method; Limit abstraction rate and volume	Low
Water use: Storage of water in a reservoir	Visual scarring	Aesthetics; Visual; Land use	Operational; Decommissioning; Closure	Low	Limit through site locality and footprint; Remedy through rehabilitation	Low

Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Water use: Storage of water in a reservoir	Change in land use (Loss of agriculture potential)	Land use	Operational; Decommissioning; Closure	Low	Limit through site locality; Limit footprint; Remedy through rehabilitation; Limit by using for agriculture purposes after Closure	Low
Material storage (e.g. fuel, oil, gas) and waste disposal (including sewage)	Soil contamination from spillages and waste disposal	Soil; Land use; Waste management	Operational; Decommissioning	Medium	Avoid through operational procedures; Prevent through management; Remedy through rehabilitation	Low
	Water pollution due to spillages and waste disposal	Water quality; I&APs; Waste management	Operational; Decommissioning	Medium	Prevent through site layout; Avoid through operational procedures; Prevent through standard management; Remedy through cleaning and rehabilitation	Low
	Littering	Land use; Aesthetics; Water quality	Commissioning; Operational; Decommissioning	Medium	Prevent through waste management; Avoid through awareness to employees	Low
	Fire risk	Health & safety; I&APs; Biodiversity	Operational	Medium	Avoid through operational procedures; Avoid through management & appropriate storage control; Control through awareness to staff; Limit risks through training	Low
General operational activities in respect of I&APs and employees	Impact on the general aesthetics of the area	Aesthetics; I&APs	Commissioning; Operational; Decommissioning; Closure	Medium	Remedy through rehabilitation; Limit through site locality & layout; Control through operational procedures	Medium
	Risk of injury to people entering the operational area	Health & safety; I&APs	Operational; Decommissioning; Closure	Medium	Avoid through access control; Avoid through rehabilitation; Awareness through induction; Avoid through fencing the operational area and open pit	Low

Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
General operational activities in respect of I&APs and employees	Risk of injury to employees working with machinery/equipment on site	Health & safety	Commissioning; Operational; Decommissioning	Medium	Avoid through appropriate PPE; Avoid through awareness & appropriate training to staff on site	Medium
	Illegal dumping & scavenging potentially resulting in safety risks to passing neighbours	Health & Safety; I&APs; Aesthetics	Operational; Decommissioning; Closure	Medium	Avoid through access control; Avoid through fencing the operational area; Control by reporting illegal dumping	Medium
	Job creation & skills upliftment	Community; Economy	Commissioning, Operational; Decommissioning	Medium (Positive)	Achieve through continuation with proposed operation; Achieve through operational procedures; Achieve through training	Medium (Positive)
	Economic development in the region	Community; Economy	Commissioning, Operational	Medium (Positive)	Achieve through continuation with proposed operation; Achieve through operational procedures	Medium (Positive)
Rehabilitation (e.g. removal of equipment, reshaping & revegetation of disturbed areas, etc.)	Soil contamination from spillages and waste disposal	Soil; Land use	Decommissioning	Medium	Avoid through rehabilitation procedures; Prevent through management; Remedy through clearance and reinstatement	Low
	Water pollution due to spillages and waste disposal	Water quality	Decommissioning	Medium	Avoid through rehabilitation procedures; Prevent through management; Remedy through clearance and reinstatement	Low
	Elevated noise levels	Noise; I&APs	Decommissioning	Low	Control through rehabilitation procedures (including working hours)	Low
	Change in surface water drainage	Topography; Storm water flow; Water quantity; Ecosystem function	Decommissioning; Closure	Medium (Positive)	Achieve through landscaping and rehabilitation of disturbed areas; Achieve through storm water control measures, e.g. berms	Medium (Positive)

Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Rehabilitation (e.g. removal of equipment, reshaping & re-vegetation of disturbed areas, etc.)	Erosion & loss of topsoil	Soil; Land use	Decommissioning; Closure	Medium	Control through storm water controls; Remedy through rehabilitation and reinstatement of affected areas; Control through erosion control & monitoring	Low
	Establishment of alien vegetation	Vegetation; Biodiversity; Ecosystem function	Decommissioning; Closure	Medium	Remedy through rehabilitation; Control through removal and management; Control through monitor of establishment of invasive plants	Low
	Establishment of a self-sustaining ecosystem	Land use; Aesthetics; Biodiversity; Ecosystem function	Decommissioning; Closure	Medium (Positive)	Achieve through landscaping and rehabilitation of disturbed areas; Achieve through establishment of natural occurring vegetation	Medium (Positive)
Cumulative impacts	Dust generation	Air quality; I&APs	Operational	Medium	Limit through operational procedures; Control through management and monitoring; Control through dust control; Limit through concurrent rehabilitation	Low
	Visual scarring	Aesthetics; Visual	Commissioning; Operational; Decommissioning; Closure	Medium	Reduced once the borrow pit on Portion 10 of the farm Mimoso Glen 885 has been rehabilitated; Limit through operational procedures; Remedy through concurrent rehabilitation; Limit by creating visual barriers, e.g. planting of high trees; Limit with good house keeping	Medium
	Elevated noise levels	Noise; I&APs	Operational	Low	Control through operational procedures (including working hours)	Low

Name of activity	Potential impact	Aspects affected	Phase	Significance (without mitigation)	Mitigation type	Significance (if mitigated)
Cumulative impacts	Change in land use (Loss of agriculture potential)	Land use	Commissioning; Operational; Decommissioning; Closure	Medium	Limit through site locality and layout; Limit footprint; Remedy through rehabilitation to an end land use potential of agriculture after Closure	Low
	Change in surface water drainage	Topography; Storm water flow; Water quantity; Ecosystem function	Operational; Decommissioning; Closure	Medium	Control through storm water controls; Limit through site layout; Remedy through rehabilitation	Low
	Habitat loss and effect on the general biodiversity	Biodiversity; Ecosystem function	Commissioning; Operational; Decommissioning; Closure	Medium	Control through operational procedures; Limit footprint; Remedy through landscaping and rehabilitation of disturbed areas; Remedy through establishment of natural occurring vegetation	Medium

6. RECOMMENDED ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURES

Information gathered from the desktop study, specialist screenings and the site assessment were used to identify the potential impacts expected to be associated with the proposed operation as listed under Section 5 of this report. Although there are impacts that have been identified that have been found to be associated with projects like this by experience, the actual occurrence of some of these impacts are unlikely due to the specific nature, site layout, specific operational procedures that will be implemented and already disturbed nature of the study area. However, minimum mitigation measures are included in this section of the report for these potential impacts as well, but it is best to be avoided.

Refer to Table 11 for a description of the environmental management and mitigation measures to be implemented as minimum throughout all the phases of the operation to prevent and/or limit the environmental impacts.

Table 11: Recommended environmental management/mitigation measures

Aspect	Recommended management/mitigation	Phase	Responsible person
Site establishment and general site management (clearance of vegetation; establishment of equipment; access road; reservoir; general management, etc.)	Transfer the environmental liabilities of the previous mining permit to the new applicant (dependant on approval of the new mining permit application).	During planning phase	Previous permit holder; Applicant
	Ensure the current status of the existing quarry is safe and environmental risks are limited until an outcome of the new mining permit has been received from DMR.	During planning phase	Previous permit holder; Applicant
	Keep a photographic record of the current status quo of the site before any further clearance during site establishment.	Prior to site clearance during commissioning phase	Site manager
	The existing access road will be used and extended as necessary to access operational areas.	During commissioning, operational and decommissioning phases	Site manager / DEO
	The preferred project locality is situated on the footprint of the previous mining permit area which has already been disturbed by mining activities and considered as the preferred locality based on specialist studies and past assessments.	During planning and commissioning phases	Applicant

Aspect	Recommended management/mitigation	Phase	Responsible person
Site establishment and general site management (clearance of vegetation; establishment of equipment; access road; reservoir; general management, etc.)	The preferred site layout is based on the current status quo, topography and permit application boundary area. This layout is expected to have the following advantages: <ul style="list-style-type: none"> - The crushing and screening plant will be situated in the north-western part of the site where it is more level for practical and low cost establishment. - The stockpile- and loading area is to the south which would be closest to the access road but also with a direct line to the plant which makes conveying possible. - The implementation of conveyors to transport product to stockpiles will limit the footprint of haul roads, generation of dust and fuel consumption by transport vehicles. - The most economic mineable area would be available for mining without the need to move the plant in the near future, running risks of standing time. - The plant and offices would be further away from the blasting impact at the open pit area. - The layout considers the more sensitive vegetation and ecosystem higher on the ridge, while also keeping a buffered distance from well defined drainage lines. 	During planning, commissioning and operational phases	Applicant / Site manager / DEO
	Limit removal of vegetation and topsoil to areas directly affected by the mining activities, office area, access road and water reservoir.	During commissioning, operational and decommissioning phases	Site manager / DEO
	Ensure that the relevant permits for the removal of protected species are in place.	Prior to commissioning phase	Applicant / DEO
	A “search and rescue” of protected plant species are recommended prior to clearance of areas to be disturbed and/or as mining progresses to undisturbed areas within the authorised site.	During commissioning, operational and decommissioning phases	DEO / ECO / Specialist
	Clear any proclaimed weed on disturbed areas before seeding. Clearing can be done manually or through the use of registered chemical substances in which case it should be used in accordance with the user specifications.	During commissioning, operational and decommissioning phases	Site manager / DEO
	No fires will be allowed within the mining permit area if not in adequate facilities for this purpose.	During commissioning, operational and decommissioning phases	Site manager
	Clear and maintain a firebreak around the mine boundary and where deemed necessary in consultation with the neighbours.	During commissioning, operational and decommissioning phases	Site manager / DEO / SHE representative

Aspect	Recommended management/mitigation	Phase	Responsible person
Site establishment and general site management (clearance of vegetation; establishment of equipment; access road; reservoir; general management, etc.)	Storm water management measures, e.g. berms and channels will be implemented to control storm water at the site and on the gravel access road to prevent erosion.	During commissioning, operational and decommissioning phases	Site manager / DEO
	Any areas where erosion is evident will be repaired and appropriate measures will be implemented to prevent re-occurrence, e.g. flow attenuation measures, gabions, berms, etc.	During commissioning, operational and decommissioning phases	Site manager / DEO
	No operational activities will be undertaken within 100m of the banks of a watercourse without the required authorisations.	During commissioning, operational and decommissioning phases	Applicant / Site manager
	A toilet facility with a french drain system is proposed for use by staff at the offices. It is recommended that additional mobile dry chemical facilities be placed at the operational area. These facilities will be cleaned in accordance with a cleaning schedule.	During commissioning, operational and decommissioning phases	Site manager / DEO
	No toilet facilities or containers containing potential hazardous substances will be situated within the 1:50 year flood line or within 100m of any watercourse, borehole or identified well.	During commissioning, operational and decommissioning phases	Site manager / DEO
	Water from the reservoir (filled from the borehole) will be used for domestic use (including the toilet facility) at the offices, while potable water in containers will be used for drinking.	During commissioning, operational and decommissioning phases	Site manager / DEO
	Ponding of water on site and stockpile areas will be managed and limited through storm water control measures, e.g. diversion berms and channels.	During commissioning and operational phases	Site manager / DEO
	Mining activities will be limited to daytime working (07:00 am – 18:00 pm unless otherwise arranged).	During commissioning, operational and decommissioning phases	Site manager
	Speed control will be enforced on the access roads to limit nuisance noise and dust.	During commissioning, operational and decommissioning phases	Site manager
	The “Chance Find Protocol”, dated August 2019 will be implemented in respect of any object with potential heritage importance unearthed throughout the life of mine.	During commissioning and operational phases	Site manager / DEO / ECO
The site will be left in a safe and clean condition at the end of every day to limit potential safety and environmental risks/impacts.	During commissioning, operational and decommissioning phases	Site manager / SHE representative / DEO	

Aspect	Recommended management/mitigation	Phase	Responsible person
Site establishment and general site management (clearance of vegetation; establishment of equipment; access road; reservoir; general management, etc.)	A register will be kept to record any complaints received from I&APs and any environmental incidents. This register shall include the response and measures implemented to mitigate incidents.	During commissioning, operational and decommissioning phases	Site manager / SHE representative / DEO
Excavation	Topsoil will be removed from the mining area prior to disturbance and stockpiled separately for use during rehabilitation.	During operational phase	Site manager / DEO
	Blasting and stripping of overburden will be undertaken prior to excavation of Aggregate. Overburden will be stockpiled separately for use as backfill of the pit during rehabilitation.	During operational phase	Site manager / DEO
	Excavation should be phased systematically to limit exposed areas. Mining is proposed to commence from the existing open pit to the east of the site, towards the west.	During operational phase	Site manager / DEO
	Storm water management measures, e.g. berms will be implemented to manage storm water and divert clean storm water around operational areas. This will also reduce the risks of erosion.	During commissioning, operational and decommissioning phases	Site manager / DEO
	The implementation of storm water control measures and erosion control will also assist in maintaining stability of the slopes at operational areas.	During operational phase	Site manager / DEO
	Ponding of water on site and within operational areas will be managed and limited through control measures such as diversion channels.	During operational phase	Site manager / DEO
	Pumping of water accumulating within the open pit to the reservoir may be considered to ensure safe continuation of mining and re-use as dust suppression. The necessary water use authorisation should be obtained if this is implemented.	During operational and decommissioning phases	Applicant / Site manager / DEO
	Should any object or site of heritage importance be unearthed, excavation in the immediate vicinity will be stopped and the South African Heritage Resource Agency (SAHRA) will be contacted.	During commissioning and operational phases	Site manager / DEO
Drilling & blasting	Drilling and blasting will be undertaken by a certified drill and blast operator.	During operational phase	Site manager / Blast operator
	Blasting will be undertaken in accordance with the AMC Safe Operating Procedure: Blasting in Surface Mines and Quarries	During operational phase	Site manager / Blast operator
	If there is a need, the vibration levels at infrastructure within the zone of influence can be monitored during blasting to identify the potential risk of damage by blasting.	During operational phase	Blast operator
	Adjacent landowner will be informed of blasting events in advance.	During operational phase	Site manager / Blast operator

Aspect	Recommended management/mitigation	Phase	Responsible person
Drilling & blasting	The blast operator will comply with The Explosives Act, 2003 (Act 15 of 2003) at all times.	During operational phase	Site manager / Blast operator
	Instantaneous Electric Detonator will be used during blasting. This limits fire risks and also allows the charging load to be controlled more effectively.	During operational phase	Blast operator
	Spot stemming length measurements shall be conducted to ensure that the correct quantity of explosive is being charged in each hole. Where there are sensitive structures within 500m radius of a blast, each hole will be measured for the correct stemming length.	During operational phase	Blast operator
	Fly rock will be prevented and/or limited through appropriate blasting procedures as specified in the relevant SOP.	During operational phase	Blast operator
	No blasting charge shall be fired if the visibility is poor because of mist, smoke, rain, etc. or during high winds.	During operational phase	Blast operator
Loading & hauling	The stockpile- and loading area is to the south of the site which would be closest to the access road for practical loading and transporting from site.	During operational phase	Site manager
	The implementation of conveyors to transport processed material to product stockpiles will limit the footprint of haul roads, generation of dust and fuel consumption by transport vehicles.	During operational phase	Site manager
	Product will be loaded directly from product stockpiles onto transporting trucks.	During operational phase	Site manager
	Speed limits of maximum 40km/h shall be enforced on vehicles to prevent accidents and to limit dust and elevated noise levels.	During operational phase	SHE representative / Site manager / DEO
	The main gravel access road also used by neighbouring landowners will be maintained up to the entrance of the mining area as and when necessary.	During commissioning, operational and decommissioning phases	Applicant / Site manager
	Dust on the haul roads will be controlled by spraying of water and speed control on heavy vehicles.	During operational phase	Site manager / DEO
Crushing & screening	Dust at the plant will be controlled by spraying of water, as well as the implementation of operational procedures. With new technology on the operational plants, it is expected that less dust would be generated. Activities will be limited and/or stopped during high wind conditions.	During operational phase	Site manager / Plant supervisor / DEO
	Operational activities with elevated noise levels will be limited to daytime working (07:00 am – 18:00 pm unless otherwise arranged).	During operational phase	Site manager / Plant supervisor / DEO
	The plant area is expected to be zoned as a higher noise risk area, meaning that employees within this area will be required to wear the required hearing protective devices.	During operational phase	SHE representative / Plant supervisor

Aspect	Recommended management/mitigation	Phase	Responsible person
Crushing & screening	Engineering interventions should be considered where possible should noise levels exceed the specified maximum.	During operational phase	SHE representative / Site manager / Engineer
Stockpiling	Topsoil shall be stockpiled in an area not prone to erosion and shall be used during rehabilitation. Topsoil stockpiles will not exceed a height of 2m.	During commissioning, operational and decommissioning phases	Site manager / DEO
	Product stockpiles should be placed outside the 1:50 year flood line or any well defined drainage lines.	During operational phase	Site manager / DEO
	The product stockpile area to the south of the site would be closest to the access road for practical loading and transporting from site.	During operational phase	Site manager
	Storm water management measures such as berms will be implemented to divert storm water around topsoil and product stockpiles.	During operational phase	Site manager / DEO
	Clear any proclaimed weed/invasive plant species on stockpiles before seeding.	During operational phase	Site manager / DEO
Water use activities: 1) Abstraction of groundwater from a borehole 2) Storage of water in a reservoir	Water from a registered borehole will be abstracted and pumped to a water reservoir. The elevated locality of the reservoir will allow gravitational feed to the plant and offices.	During commissioning, operational and decommissioning phases	Site manager
	Water from the will be used for domestic use at the offices and for dust suppression at the plant and haul roads (when necessary).	During commissioning, operational and decommissioning phases	Site manager
	The volume abstracted and stored will comply with the permitted volume. Should any water use become applicable in future, the necessary applications will be submitted to Department Water and Sanitation prior to commencement of such water use.	During commissioning, operational and decommissioning phases	Applicant / Site manager / ECO
Material storage	Approximately 10 000 litres of diesel for use by mining vehicles will be stored on site. This fuel should be stored in appropriate containers and situated within bunded area. The bund wall should be able to contain 110% of the total volume of the substance stored at any given time.	During commissioning, operational and decommissioning phases	Site manager / DEO
	Bund walls shall be to the specifications of the standard AMC Operating Procedure: Chemical and Hydrocarbon Management and Environmental Best Practice.	During commissioning, operational and decommissioning phases	Site manager / DEO
	No potential hazardous substance will be stored within the 1:50 year flood line or within 100m of a watercourse, borehole or identified well.	During commissioning, operational and decommissioning phases	Site manager / DEO

Aspect	Recommended management/mitigation	Phase	Responsible person
Material storage	Any potential hazardous material/substance on site (if any) will be stored in accordance with manufacturer instructions and separate from other equipment and material. The necessary approvals will be obtained dependant on the type and volume of material on site.	During commissioning, operational and decommissioning phases	Site manager / DEO / ECO
	Any gas will be stored in a secure, well-ventilated area.	During commissioning, operational and decommissioning phases	DEO / SHE representative
	Drip trays will be used where necessary to prevent and/or limit any spillages to the surrounding environment.	During commissioning, operational and decommissioning phases	DEO Supervisors /
	Any spillage of potential hazardous substances or petrochemical products shall be cleaned immediately and the affected area shall be reinstated.	During commissioning, operational and decommissioning phases	DEO Supervisors /
	Any contaminated soil will be removed and placed into suitable receptacles for disposal at an authorised disposal facility. Alternatively, the contaminated soil/material can be treated with proven in situ rehabilitation products.	During commissioning, operational and decommissioning phases	DEO Supervisors /
	Used oil and/or lubricants will be removed from site. This can be arranged with a certified removal company. No disposal on site will be allowed.	During commissioning, operational and decommissioning phases	DEO Supervisors /
	In the case of a major spill, the responsible departments (i.e. DMR, DWS and DESTEA) will be notified of the incident within 24 hours.	During commissioning, operational and decommissioning phases	DEO / ECO / Site manager
Waste generation (i.e. domestic solid waste, sewage, hazardous waste)	Appropriate waste management and waste minimisation shall be implemented on site.	During commissioning, operational and decommissioning phases	Site manager / DEO
	No littering and/or disposal of any waste shall be allowed on site.	During commissioning, operational and decommissioning phases	DEO Supervisors /
	Solid waste shall be collected in appropriate bins on site. Waste shall be separated into the different waste streams. General waste will be disposed of at the Bloemfontein northern landfill site at least once a week (or as necessary).	During commissioning, operational and decommissioning phases	DEO Supervisors /
	No hazardous waste, e.g. used oil, lubricants, etc. shall be stored permanently on site. If any, it shall be collected in a holding tank and sent back to the supplier or collected by a specialist oil recycling company.	During commissioning, operational and decommissioning phases	DEO Supervisors /

Aspect	Recommended management/mitigation	Phase	Responsible person
Waste generation (i.e. domestic solid waste, sewage, hazardous waste)	The toilet facilities should be placed at least 100m from any watercourse. The facilities will be cleaned in accordance with a cleaning schedule and proof thereof shall be kept on site for inspection on request.	During commissioning, operational and decommissioning phases	Site manager / DEO
	No activities that require a Waste License will be undertaken as part of this current application. All sections of the NEM: Waste Act, 2008 (Act 59 of 2008) pertaining to the disposal of waste must be adhered to.	During commissioning, operational and decommissioning phases	Site manager / DEO
Environmental awareness	All employees should be given an induction on environmental awareness. Proof of such induction will be kept on site for inspection on request.	During commissioning, operational and decommissioning phases	Site manager / DEO / SHE representative
Health & Safety	The revised AMC Safety Management Plan, dated November 2018 will be adopted and implemented on site.	During commissioning, operational and decommissioning phases	Site manager / Safety officer
	The necessary PPE relevant for each activity on site will be provided to employees. No person or contractor will be allowed on site without the minimum PPE, including (but not limited to): appropriate clothing, safety shoes, hard hat, ear plugs/muffs in high noise risk areas, protective glasses.	During commissioning, operational and decommissioning phases	Site manager / SHE representative
	Fire extinguishers will be kept on site and will be inspected as regulated.	During commissioning, operational and decommissioning phases	Safety officer
	Health & Safety legislation will be adhered to at all times. The necessary medical investigations and induction will be provided to employees as per the required time frames.	During commissioning, operational and decommissioning phases	Site manager / SHE representative
	Noise levels and airborne pollutants (e.g. dust) on site will be monitored in accordance with the AMC COP specifically for these aspects. Areas likely to have with higher potential risks include the crusher area and generator (if applicable). Appropriate PPE will be provided to employees exposed to these areas.	During commissioning, operational and decommissioning phases	Site manager / SHE representative
	Access control and appropriate signage shall be implemented at the mining permit area.	During commissioning, operational and decommissioning phases	Site manager / SHE representative
	Ensure the blasting area is clear of any unauthorised persons during delivery, handling, use and destruction of explosives or during a blast event.	During operational and decommissioning phases	Blast operator

Aspect	Recommended management/mitigation	Phase	Responsible person
Health & Safety	The pit area will only be opened after a blast once the site has been inspected for misfires/cut-offs, or when it is safe to do so. Specified procedures will be followed in the event of misfired holes to ensure safety.	After blasting during the operational phase	Blast operator
	All employees working with mining equipment and machinery shall be properly trained in their specific tasks to prevent and/or limit injuries.	During commissioning, operational and decommissioning phases	Site manager / Safety officer / Supervisor
	A first aid kit will be available on site at all times. The kit will be inspected and filled as regulated.	During commissioning, operational and decommissioning phases	Safety officer
	A register will be kept to record any incidents related to Health and Safety aspects.	During commissioning, operational and decommissioning	Site manager / SHE representative
General operational activities	The following standard AMC Code of Practice (COP) and Safe Operating Procedure (SOP) (but not necessarily limited thereto) will be adopted for implementation on site to limit potential environmental as well as health and safety risks: <ul style="list-style-type: none"> - Occupational Health Programme: Noise - Personal exposure to airborne pollutants - Blasting in surface mines and quarries - Chemical and hydrocarbon management 	During commissioning, operational and decommissioning phases	Site manager / Safety officer / SHE representative / Blast operator
	Appropriate mitigation measures will be implemented in the event of an environmental incidence, e.g. spillage, etc.	During commissioning, operational and decommissioning phases	Site manager / DEO / Supervisor
	All mining equipment will be maintained in a good working condition and operations will be limited to daytime to limit noise disturbance.	During operational and decommissioning phases	Site manager / Service technician
	Any services and/or repairs on machinery and vehicles shall be undertaken at a workshop and/or cement slab. Should services or minor repairs be undertaken on site, appropriate management measures, e.g. drip trays, to prevent any spillage of oil, diesel etc.	During commissioning, operational and decommissioning phases	DEO / Operators / Service technician
	Drip trays etc. should be used where necessary and at stationary equipment to prevent and/or limit any spillages to the surrounding environment.	During commissioning, operational and decommissioning phases	DEO / Operators
	Spillages shall be reported to the supervisor and Safety Department of AMC. Appropriate action will be implemented to determine the extent of the spill and to clean and reinstate the affected footprint immediately. Spill kits should be kept on site for proper spill response.	During commissioning, operational and decommissioning phases	DEO / Operators

Aspect	Recommended management/mitigation	Phase	Responsible person
General operational activities	In the case of a major spill, the responsible departments (i.e. DMR, DWS and DESTEA) should be notified within 24 hours.	During commissioning, operational and decommissioning phases	Site manager / DEO
	Any contaminated soil will be removed and placed into suitable receptacles for disposal at an appropriately permitted waste disposal facility. Alternatively, the contaminated soil/material can be treated with proven in situ rehabilitation products if only small volumes are present.	During commissioning, operational and decommissioning phases	DEO
	Hydrocarbon and chemical polluted material (e.g. boxes, plastic, rags, etc.) will be stored in hazardous waste containers (210L drums) and taken to a chemical waste storage area when full. It is recommended that no such material be stored on site, but collected by an approved company and removed from site.	During commissioning, operational and decommissioning phases	DEO
Rehabilitation	Concurrent rehabilitation is to be undertaken where possible on disturbed areas.	During operational phase	Site manager / DEO
	No equipment, redundant structures, waste or stockpiles will remain on site after rehabilitation.	During decommissioning and Closure	Site manager / DEO
	Any waste on site during the Decommissioning Phase will be disposed of appropriately at a registered waste disposal facility.	During decommissioning and Closure	Site manager / DEO
	Final rehabilitation of disturbed areas, e.g. stockpile areas will include landscaping and covering with topsoil.	During decommissioning and Closure	Site manager / DEO
	If it is found that vegetation does not establish within a reasonable time after top soiling was done, analyses will be done and the area seeded with natural occurring vegetation if necessary.	During decommissioning and Closure	Site manager / DEO
	The final open void will be made safe by ensuring acceptable slopes and/or benches. Where this is not possible the area will be fenced to prevent entrance.	During decommissioning and Closure	Site manager
	The main objectives of rehabilitation would be to create a self-sustaining ecosystem over time, depending on the end land use. It is anticipated that the open void will in time form an artificial water ecosystem.	Closure	Site manager
Environmental monitoring and reporting	An environmental monitoring and reporting plan should be developed. This should include a reporting hierarchy to staff on site in the event of an environmental incident.	During commissioning, operational and decommissioning phases	Site manager / DEO
	A Designated Environmental Officer (DEO) should be appointed and will be responsible for the daily environmental aspects related with the operation on site.	During commissioning, operational and decommissioning phases	Site manager

Aspect	Recommended management/mitigation	Phase	Responsible person
Environmental monitoring and reporting	The DEO should ensure compliance with all relevant environmental legislation.	During commissioning, operational and decommissioning phases	DEO / ECO
	The mining and rehabilitation process should be monitored and controlled on a daily basis. Environmental incidents should be recorded monthly and reported in the annual performance assessment report.	During commissioning, operational and decommissioning phases	Site manager / SHE representative / DEO / ECO
	An independent ECO should be appointed to conduct the Annual Environmental Performance Assessment and Financial Review for submission to DMR.	During operational phase	Site manager / ECO
	The mining permit (if considered for approval) should be renewed within the first 2 years of the date of issue, after which it should be renewed annually for another 3 years.	During operational phase	Site manager / ECO
	A Material Safety Data Sheet (MSDS) shall be kept for each chemical used on site and annual training will be provided to personnel.	During operational and decommissioning	Site manager / Safety officer / Store supervisor
	The Hazardous Substance Register will be maintained and reviewed quarterly.	During operational and decommissioning phases	Store supervisor
	The establishment of alien vegetation will be monitored through weekly visual checks and cleared where necessary.	During commissioning, operational and decommissioning phases	DEO
	The site will be inspected for erosion on a weekly basis and/or after rain events. Areas with excessive erosion will be reinstated and appropriate measures will be implemented to prevent reoccurrence.	During commissioning, operational and decommissioning phases	DEO
	Visual checks of the side walls of the open pit will be undertaken monthly to identify any potential instable areas. Measures such as erosion and storm water control will be implemented to limit instability risk areas. This will also be addressed through blasting procedures.	During commissioning, operational and decommissioning phases	DEO / Blast operator
	Monthly fall out dust monitoring will be undertaken.	During commissioning, operational and decommissioning phases	DEO / Air quality specialist
	The volume of groundwater abstracted will be monitored on a monthly basis.	During commissioning, operational and decommissioning phases	DEO
	Any complaints received from I&APs and stakeholders regarding non-compliance with the EMPr should be recorded and measures shall be implemented to mitigate the non-compliance.	During commissioning, operational and decommissioning phases	Site manager / DEO

Aspect	Recommended management/mitigation	Phase	Responsible person
Environmental monitoring and reporting	The measure of noise exposure to employees on site will be conducted in accordance with AMC's standard COP Occupational Health Programme: Noise and reported on as per the programme.	During operational phase	Safety officer
	Personal exposure of employees to airborne pollutants on site will be monitored in accordance with AMC's standard COP: Personal Exposure to Airborne Pollutants and reported on monthly to the site manager.	During operational phase	Safety officer

DRAFT