

COPY

Swakop Calcite (Pty) Ltd

Petmar # 6, Riverside Avenue, Swakopmund
P.O. Box 2499, Windhoek
Tel: +264 61 227380
Cell: +264 81 2899718
email: oliver@gecko.na



16 November 2021

The Environmental Commissioner
Ministry of Environment Forestry and Tourism
c/o Robert Mugabe and Uhland Streets
Windhoek



Dear Sir

RE: Renewal of Environmental Clearance Certificate (ECC) for the proposed Dolomite quarry on Mining Claims (MCs) 68937 and 68938 in Karibib, Erongo Region

1. This is an application made in terms of Section 32 of the Environmental Management Act, 7 of 2007 ("the Act") for the renewal of an ECC in respect of the above mining claims which was previously issued to the applicant on the 05.04.2018 (see attachment).
2. In support of the previous ECC application, Swakop Calcite (Pty) Ltd, which was previously named Gecko Limestone, submitted an Environmental Impact Assessment and Environmental Management Plan for the proposed dolomite quarry within the boundaries of the project area. No activities were carried out within the MCs during the year 2018 to 2021.
3. In the light thereof the EIA and EMP previously submitted will not be superseded, taking into consideration that no work was conducted and therefore no new impacts are expected at all stages of the project apart from those which have been previously identified in the documents submitted.
4. Furthermore, we would kindly request that the new ECC should be issued under the company's new name "**Swakop Calcite (Pty) Ltd**". The proof of company name change is attached to this letter.
5. In terms of Section 57 of the Act, the current approval granted for the area expired on the 05th of April 2021. In the light thereof, we attach hereto the duly completed Form-1 (Annexure A), duly stamped in the amount of N\$300.00, representing the prescribed fee.
6. Annexure A provides a copy of the expired ECC for the proposed dolomite quarry
7. Annexure B provides the renewal Application form 1.
8. Annexure C provides the proof of company name change details
9. Annexure D provides the previously submitted and approved EMP
10. We kindly request that the Environmental Commissioner shall:

Register the Applications in the prescribed assessment register as provided for in subsection 33(1)(a) of the Act towards a renewal of the existing environmental clearance.

11. I confirm that a decision taken by the Environmental Commissioner under subsection 33(1) of the Act, does not exempt the company from complying with other requirements prescribed in respect of the proposed activity under any other law.

Yours faithfully

Acknowledge receipt



Oliver Krappmann
Director

Name
Position:
Date:



**DRAFT ENVIRONMENTAL MANAGEMENT PLAN
FOR THE PROPOSED DOLOMITE QUARRY
AT KARIBIB**



November 2016

Prepared For:
Gecko Limestone (Pty) Ltd

Prepared By:
Chitalu Shikaputo

Title	Draft Environmental Management Plan for the Proposed Dolomite Quarry at Karibib
Author	Chitalu Shikaputo
Client	Gecko Limestone (Pty) Ltd
Version	02 – Draft for Client Review
Reviewer 1	Philip Hooks
Reviewer 2	Lovisa N Amwele
Date 1	28.02.2017
Date 2	16.11.2021
Reference	Shikaputo, C., 2017. Draft Environmental Management Plan for the Proposed Dolomite Quarry at Karibib. Assessed for Gecko Limestone (Pty) Ltd

ABBREVIATIONS

DWA	Department of Water Affairs
EA	Environmental Audit
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
ECP	Environmental Control Procedure
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ERA	Environmental Risk Assessment
ERP	Emergency Response Plan
HSE	Health Safety Environment Officer
MD	Managing Director
MET	Ministry of Environment & Tourism
MC	Mining Claims
MME	Ministry of Mines & Energy
MP	Management Plan
ms	Milli-Second
MSDS	Materials Safety Data Sheet
PM	Project Manager
RA	Roads Authority
RO	Research Officer
WRD	Waste Rock Dumps

1 INTRODUCTION

Gecko Limestone (Pty) Ltd (hereafter referred to as the proponent) plans to re-open and extend an existing dolomite quarry along the boundaries of Farms Karibib and Okongava in the Erongo Region. The previous mining claims owner, Mr Berger, had excavated a quarry pit at the claims and transported the ore to the crushers within the Karibib town. The proposed mineral to be mined is dolomite from an existing open cast quarry. A significant amount of the dolomite resource has been identified within the two mining claims. The material is envisaged for use as basic construction materials, fillers and decorative purposes in Southern Africa.

This Environmental Management Plan (EMP) documents a series of individual management programmes (MPs) designed to meet legal requirements for the activities related to the proponents operations. The EMP aims to avoid or minimise potential negative impacts, while optimizing the potential positive impacts associated with the quarrying operations and decommissioning once the activity has been completed.

2 PROJECT OVERVIEW

A short description of the project and the location is laid out below.

2.1 Project Location

The two mining claims where the proposed dolomite mining will take place are situated 8km south east of Karibib, bordering the resettlement Farm Okongava to the south and Farm Karibib. The Farm Karibib is part of the municipal town land. To get to the mining claims one must travel along district road D1953 and turn into district road D1992. The turn off to the mine is about 1.8 km along D1992. The access road to the existing quarry is within the boundary of the Resettlement Farm Okongava.

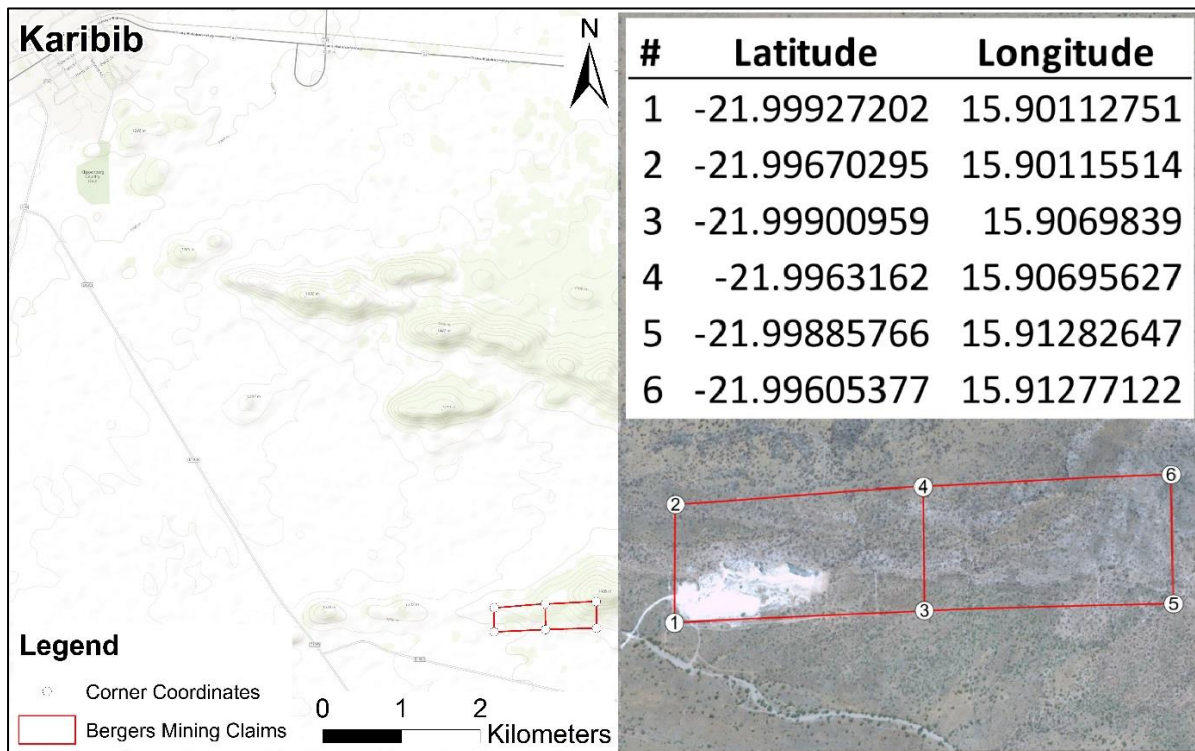


Figure 1. Map showing the location of the quarry relative to Karibib Town

2.2 Project Description

Quarry operations will include clearing of land, blasting, extraction, crushing, milling and the subsequent stockpiling for haulage.

During construction, the selective clearing of vegetation in areas designated for surface infrastructure and the stripping and stockpiling of topsoil and sub-soil (if any) will be minimal when the operations are restarted as considerable area has already been cleared. Digging of foundations and trenches, as well as drilling and blasting are associated with the expansion of the existing open pits as well as the development of a new quarry pit. No power supply infrastructure to the site is planned. No permanent on-site staff accommodation is planned except for security personnel. Temporary handling and storage areas for construction materials, explosives etc. is planned. The support services and facilities constructed during this phase will either be removed at the end of the construction phase or incorporated into the further phases of the project.

During operations, a mobile crushing unit will be used on site. A rod mill will also be present on site to further grind the rocks to provide a reduced feedstock for the processing phase. Blasting will only occur during day light hours so as to reduce any noise nuisance for nearby neighbours. Crushing operations may occur on a 24 hour basis. There will be no processing plant on site, crushed and milled materials will be transported to Swakopmund by road or by using the railway.

Decommissioning activities will include the removal of infrastructure, preparation of final land forms for closure and encouraging vegetation growth in order to reduce the effects of soil erosion and to re-establish normal ecosystem functionality so as to rehabilitate the environment.

3 EMP OBJECTIVES

The main purpose of the Environmental Management Plan (EMP) is to provide a strategy for the identified socio-economic and biophysical impacts in order to provide measures that prevent/ offset the effects of significant adverse impacts, while, providing strategies for maintaining or enhancing positive impact effects; thereby ensuring that the low impacts remain low so that they are of low significance.

This mode of environmental protection is implemented in all the activities associated with the proponent operations, ensuring that time and national resources are not wasted and that problems occurring during all operations are identified and rectified to prevent damage to the environment.

The following overall environmental objectives have been set for the management the dolomite quarrying operations and expansion project components. If any issues were overlooked, the plan must be amended in consultation with the proponent and regulatory authorities. Therefore the EMP objectives are:

- To comply with national legislation and standards for the protection of the environment.
- To limit potential impacts on biodiversity through the minimisation of the footprint and the conservation of residual habitat within the mine area.
- To ensure the proponents operations are managed efficiently and effectively to reduce or avoid negative impacts and enhance positive impacts of the operations
- To keep surrounding communities informed of the quarrying activities through the implementation of forums for communication and constructive dialogue between the proponent and all those affected
- To conserve soil resources by stripping, stockpiling and managing topsoil.

- To minimise the potential for dust emissions through the implementation of dust control measures.
- To minimise the potential for noise and vibration disturbance in surrounding areas.
- To undertake rehabilitation wherever possible during the life of the quarry.
- Prevent and minimise all forms of pollution.
- To include all components of the operations of the project.
- To prescribe the best practicable control methods to lessen the environmental impacts associated with the operations of the project.
- To monitor and audit the performance of operational personnel in applying such controls.
- To ensure that appropriate environmental training is provided to responsible operational personnel.

The Environmental Management Act and Regulations require that an environmental management plan for the proposed project be developed (see Legal Section of EIA Scoping Report). The Management Programmes within this EMP have therefore been compiled to satisfy requirements based on the regulations for all developmental projects in Namibia.

4 ENVIRONMENTAL MANAGEMENT ROLES AND RESPONSIBILITIES

The main parties that are responsible for specific aspects of the EMP's implementation or to whom the responsibility reports are:

- The **Proponent**- Gecko Limestone(Pty) Ltd;
- **Project Manager** (PM);
- The **Environmental Assessment Practitioner** (EAP)
- The **Environmental Control Officer** (ECO)

4.1 Proponent

Bears the ultimate responsibility for quarry operations, and is thus responsible for environmental performance. Must be informed of environmental issues and impacts of all operations (existing and future) and the resultant effect that such activities have on the environment;

4.2 EAP

Undertakes Environmental Impact Assessment and generates a draft Environmental Management Plan, completes EIA and EMP reports, ensures overall compliance of the EMP and undertakes periodic external environmental audits.

4.3 ECO Detailed Responsibilities

Monitors the implementation of the EMP as well as to identify potentially detrimental impacts not identified in the EMP so that it can be reviewed and updated. The following list outlines the ECO's responsibilities:

- Responsible for maintaining compliance to the EMP and any other relevant legal requirements e.g. permits and authorisations.
- Implementation of the Environmental Management System (EMS).
- Coordination, monitoring and consultation with stakeholders and personnel, including the promotion of environmental management competence and providing risk assessment expertise.
- Undertake Environmental Risk Assessments (ERAs).

- Set environmental objectives and targets.
- Monitoring of systems to ensure compliance to legislation and company policies.
- To facilitate updating of the environmental management process and ascertaining the state of environmental risk and performance.
- Compile biannual reports for MET.
- Ensuring that all personnel undergo environmental awareness training as per company environmental standards on an ad hoc basis.
- Coordinate internal and external environmental audits.
- Submit required information to relevant authorities such as reporting related to monitoring and with regard to compliance with the EMP, permit and relevant authorisations.
- Liaise with Gecko Limestone (Pty) Ltd management and various external stakeholders such as authorities and interested and affected parties on environmental management

5 ENVIRONMENTAL TRAINING AND CAPACITY BUILDING

The proponent is responsible to ensure all personnel are trained on all the company Health, Safety and Environment (HSE) policies relevant to the site. The plant equipment technical team must be trained to maintain the plant. Equipment manuals must be supplied and the supplier data sheets. HSE manuals must be available on site at all times. Material Safety Data Sheets (MSDS) are to be available for quick reference.

Where the capacity of the personnel is insufficient the proponent must take up the responsibility to build capacity especially where compliance to HSE issues are lacking. For this EMP to be successful, compliance monitoring is essential. Reporting the data from the monitoring to the environmental authority will be necessary in order to show that capacity building and training has been carried out.

6 ENVIRONMENTAL MANAGEMENT SYSTEM

The EMP guidelines provide a framework for creating a process and document control system. This system is commonly referred to as an Environmental Management System (EMS). This system includes the aspects of monitoring and reporting which are outlined in the EMP guidelines.

Gecko should strive to align its EMS in accordance with ISO 14001 standards. ISO 14001 is the world's most recognised EMS framework which can enable the proponent to demonstrate sound environmental management by minimising the harmful effects on the environment and enhancing the positive effects, thus achieving continual improvement through a formal EMS.

Some of the EMS documentation elements are described below. The detailed documentation for every environmental aspect needs to be developed by the various officers. The documentation will consist of the company environmental policy, and an EMS manual that will act as a guide with completing the EMS. There may be considerable overlap between the health, safety and environment fields and it is advised that these three management systems be integrated especially where human and material resources are limited. The ECO can fulfil all three roles.

The ECO must take up the training, monitoring and reporting responsibility. It is important that the monitoring of the necessary environmental aspects of operations is undertaken. The main purpose of monitoring is to ensure that the prescribed mitigation measures / actions in the EMP are complied with. The ECO officer should write up a monitoring report on a monthly basis. This can be compiled from the environmental control data sheet records. The environmental control data sheets need to be compiled in conjunction with the Environmental Control Procedure (ECP). The specialist health,

safety and environment personnel should write up the ECPs for the various measures, controls and processes.

The proponent should strive to have an EMS in place with all relevant and necessary documentation and practicable and applicable requirements that should be implemented in the planning phase and be maintained during construction and operational phases.

The proponent could implement an Environmental Management System (EMS) to manage the 9 environmental programmes. However, a good EMS goes beyond mere implementation of the EMP. An EMS is internationally recognized as best practice that will ensure ongoing incorporation of environmental constraints. At the heart of an EMS is the concept of continual improvement of environmental performance with resulting increases in operational efficiency, financial savings and reduction in environmental, health and safety risks. An effective EMS would need to include the following elements:

- A stated environmental policy which sets the desired level of environmental performance;
- An environmental legal register;
- An institutional structure which sets out the responsibility, authority, lines of communication and resources needed to implement the EMS;
- Identification of environmental, safety and health training needs;
- Implementation of the EMP's Environmental programmes;
- Stipulated environmental objectives and targets to be met, and work instructions and controls to be applied in order to achieve compliance with the environmental policy;
- Periodic (internal and external) audits and reviews of environmental performance and the effectiveness of the EMP and EMS;
- Complete development of a Mine Closure Plan submitted and approved by MET and MME.

7 ENVIRONMENTAL IMPACTS

The key environmental impacts identified and discussed in the dolomite quarry scoping report for operations were identified by site visits, consultation with the proponent and a scoping assessment.

7.1 Key Positive Environmental impacts

The following key issues and potential positive impacts associated with the proposed operations are:

- The operations help to create jobs and long term employment.
- The local economy benefits; through direct contribution to Gross Namibian Income (GNI) of the quarry.
- Create a market based demand for dolomite materials locally and internationally.
- Reducing income inequality, increasing job creation and economic growth.
- Implementation of environmental management measures to mitigate negative impacts.
- Environmental awareness created for all the quarry operational personnel through training.
- Improve the standard of living of the proponent's employees.

7.2 Key Negative Environmental Impacts

- Potential decrease in the road surface integrity due to increased haulage frequency could incur more frequent spending on road repairs.
- Potential air pollution from vehicle fumes and during windy conditions from dust generating activities.

- Potential decrease in aesthetic value of the area earmarked for mining as vegetation and top soil will be cleared as it is prepared for quarry operations and expansion.
- Potential increases in personnel resulting in increased waste and sewerage generation.
- Potential increase of soil erosion as a result of stripping of top soil during the quarry operations.
- Natural resource depletion, loss of land (habitat), change in land-use potential.
- Potential impact on health and safety (security) of personnel.
- Potential pollution disturbance and alteration of water quality.
- Potential nuisance factor from noise creation may increase.

8 EMP IMPLEMENTATION GUIDELINES

The potential impacts resulting from the proposed operations were evaluated in the scoping report. The suggested mitigations, if implemented, for potentially negative impacts will reduce the impacts on the biophysical and socio-economic environment so that their significance is negligible. The mitigation measures are included in the EMP implementation guidelines below. **Table 1 to Table 14** describe the 9 management programmes for the main potential impacts to mitigate and/or enhance the potentially significant environmental and socio-economic impacts.

This document may need to be periodically reviewed and updated due to new insights or operational changes to ensure that all the environmental impact aspects are included. It is the intention that this EMP should be seen as a “living document” which will be amended during the operations, as the activities might change or new ones be introduced

This operational EMP categorises aspects into loosely defined phases of planning, construction, operational, and decommissioning phases. These phases are applicable in the following ways:

- elements of the **planning phase** apply to the current scoping report preparation, the review process, permit and certificate renewal periods;
- the establishment of new activities on site and the upgrading of infrastructure or equipment is covered under the **construction phase**;
- extraction, blasting, crushing, milling and haulage of the resource falls under the **operational phase**;
- should any of the activities discussed ever draw to a close then the **decommissioning phase** section will be applicable in particular the application of the fund to the rehabilitation of the quarry.

The following programmes are discussed in detail in the tables that follow:

1. Air quality Management Programme
2. Noise Management Programme
3. Health & safety Management Programme (includes Security)
4. Visual Management Programme
5. Stakeholder Communication Management Programme (include socio-economic aspects)
6. Waste Management Programme
7. Ecology Management Programme
8. Water Resource Management Programme
9. Mine Closure & Rehabilitation Management Programme

Table 1. Air Quality Management Programme

Risk Event	Disturbances to soil and rock resulting in excessive dust in the atmosphere		
Description	<p>Dusty atmospheric conditions do prevail around Karibib during the winter months when dry north easterly winds blow. Dolomite mining activities may generate dust due to the nature of the substrate:</p> <ul style="list-style-type: none"> ➤ Movement of vehicles along road network hauling ore to the plant on site are likely to lift dust into the air. ➤ Drilling and blasting will most definitely cause dusty conditions. ➤ Crusher, sifting screens and conveyor functioning result in dusty conditions <p>The surrounding habitats receive the dust that emanates from the mining activities which may potentially be affected. Fauna and flora alike could be impacted as ecosystem functioning is affected.</p> <p>Negative effects of dust on personnel working at the quarry site are likely to occur if dust suppression techniques are not employed and personal protection equipment is not used to safeguard the health of personnel.</p>		
Status	Negative		
Phases	Phases during which sources of dust apply are highlighted below; Significance assessment was carried out on the operational phase which presents a long term risk.		
Construction Phase	Operational Phase	Decommissioning Phase	Post Closure
Crushers & screens	Crushers & screens	Dismantling crushers & screens	Background levels will most likely become prevalent soon after closure.
Conveyor construction	Conveyor functioning	Dismantling conveyors	
Road network establishment	Road use and maintenance	Demolishing buildings	
Building construction	Drilling & blasting	Rehabilitation of slopes	
	Ore haulage from quarry pit	Constructing fences	
Severity	Moderate / measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints. Noticeable loss of resources.		
Duration	Reversible over time. Life of the project. Medium term		
Spatial Scale	Fairly widespread – Beyond the site boundary. Localised at best. Though this does depend on mobility of particles and prevailing weather conditions.		
Probability	Definite and continuous		

Prevention	Dust creation cannot be prevented completely. Water is normally used to suppress dust on the roads. However, this scarce resource cannot be applied continuously and indiscriminately.
Mitigation Action	<p>Dust suppression techniques will be necessary when dust becomes an issue during the dry winter months. The following can be done to reduce exposure of the environment and personnel to continuous and excessive dust plumes:</p> <ul style="list-style-type: none"> ➤ Avoid dust generating activities that create excessive dust during windy conditions. ➤ The new and refurbished roads should have a hard surface whose integrity will not be easily compromised. ➤ Personnel are required to wear personal protection equipment if excessive dust should be created. ➤ All vehicles transporting crushed material off site should be covered with a tarpaulin when travelling on the highways. ➤ Windbreaks and covers can be used to reduce lifting of dust from crushers, screens and conveyors. ➤ Water spays at the various plant components with effectively keep dust from blowing into the atmosphere. ➤ The road network within the mine site can be sprayed with water and other dust suppressants during dry dusty conditions.
Monitoring	<p>A dust bucket network is recommended so that monthly dust fallout can be documented. Acceptable limits as proposed by the Ministry of Environment & Tourism must be complied with. In the absence of such guidelines, typical ambient conditions prior to operations can be compared to guidelines used by RSA and Botswana and limits can be set for this project. Comparisons can be made with conditions recorded by the Navachab Gold Mine.</p> <p>A complaints register should be kept.</p>

Table 2. Noise Management Programme

Risk Event	Disturbance of sense of place and the effect on tranquil ambient noise levels		
Description	<p>Potential noise sources during the mining and processing activities could originate from vehicles, earthmoving equipment like excavators and graders, generators, drilling and blasting, crushers, screens and conveyors. The irritation issue of these noise sources will depend on the closeness of the mining activities to various receptors. The nearest farm homestead to the east is 1.5km from the easternmost boundary of the claims. Currently, the homestead is about 2.5km from the edge of quarry pit. Only people stopping along the district road which is adjacent to the mining area may experience some noise emanating from mining activities. The distance from the quarry pit to the district road is about 2km.</p> <p>For rural districts the day time ambient noise level requirement outlined in SANS 10103 (2008) between 6am and 10pm is 45dBA (A-weighted decibel). This is in line with the guidelines published by the World Health Organisation (WHO). The noise levels should not exceed the ambient noise levels for rural settings.</p>		
Status	Negative		
Phases	Phases during which sources of noise will apply are highlighted below; Significance assessment was carried out on the operational phase which presents a long term risk.		
Construction Phase	Operational Phase	Decommissioning Phase	Post Closure
Crushers & screens	Crushers & screens	Dismantling crushers & screens	Background or baseline levels will most likely become prevalent again immediately after closure.
Conveyor construction	Conveyor functioning	Dismantling conveyors	
Vehicles on road network	Vehicles on road network	Demolishing buildings	
Building construction	Drilling & blasting	Rehabilitation of slopes	
	Ore haulage from quarry pit	Constructing fences	
Severity	Moderate / measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints. Noticeable loss of resources.		
Duration	Reversible over time. Life of the project. Medium term		
Spatial Scale	Fairly widespread – Beyond the site boundary. Localised at best. Though this does depend on mobility of particles and prevailing weather conditions.		
Probability	Definite and continuous		

Prevention	<p>Noise creation cannot be prevented and will occur and should be mitigated. The district road traffic and the other mine to the NNE contributes to a baseline condition for a radius of 4km around the claims. Additional traffic now on the road for hauling product cannot be avoided.</p>
Mitigation Action	<p>There are industrial standards to which the noise sources (i.e. machinery) must comply. Regular maintenance of machinery should maintain the acceptable noise levels for operators working with the machines. It is not clear whether this will produce the accepted rural standard at the farm homestead.</p> <p>It is recommended that any complaints regarding noise be recorded and included in the environmental reports. Should complaints persist then a survey by a suitably qualified and independent hygienist will be required.</p> <p>Shields which deflect the noise away from receptors may reduce the decibels to within the rural standards. The placement of stockpiles and buildings will also play a role to ensure sources of noise are not directly in line with the farm homestead.</p>
Monitoring	<p>A mechanism to monitor noise levels, record and respond to complaints and mitigate impacts should be developed.</p> <p>Monitoring:</p> <ul style="list-style-type: none"> ➤ Keep a register of all complaints received and remediation action taken. ➤ Survey noise levels annually <p>Performance Indicator:</p> <ul style="list-style-type: none"> ➤ Number of registered complaints ➤ Noise monitoring plan is on file. ➤ Record all information in a biannual report.

Table 3. Health & Safety Management Programme – Noise and Vibration Effects on Personnel

Risk Event	The effects of excessive noise and vibration on the health and safety of personnel.		
Description	<p>Noise:</p> <ul style="list-style-type: none"> ➤ Long term exposure to high levels of noise can cause permanent hearing loss. Neither surgery nor a hearing aid can help correct this type of hearing loss. ➤ Short term exposure to loud noise can also cause a temporary change in hearing (your ears may feel stuffed-up) or ringing in your ears (tinnitus). These short-term problems may go away within a few minutes or hours after leaving the noisy area. <p>Vibration:</p> <p>Different vibration types are defined as:</p> <ul style="list-style-type: none"> ➤ Hand-Arm Vibration is defined as mechanical vibration that, when transmitted to the human hand-arm system, entails risks to the health and safety of workers, in particular vascular, bone or joint, neurological or muscular disorders. ➤ Whole-Body Vibration is defined as the mechanical vibration that, when transmitted to the whole body, entails risks to the health and safety of workers, in particular, lower back morbidity and trauma to the spine. 		
Status	Negative		
Phases	Phases during which sources of noise and vibration will apply are highlighted below; Significance assessment was carried out on the operational phase which presents a long term risk.		
Construction Phase	Operational Phase	Decommissioning Phase	Post Closure
Crushers & screens	Crushers & screens	Dismantling crushers & screens	Background or baseline levels will most likely become prevelant again immediately after closure. Personnel no longer on site.
Conveyor construction	Conveyor functioning	Dismantling conveyors	
Vehicles on road network	Vehicles on road network	Demolishing buildings	
Building construction	Drilling & blasting	Rehabilitation of slopes	
	Ore haulage from quarry pit	Constructing fences	
Severity	Substantial deterioration (permanent damage to spine from vibration or hearing). Recommended level will often be violated. Personnel potentially unable to work any longer.		

Duration	Permanent. Beyond closure. Long term.
Spatial Scale	Localised - Within the site boundary.
Probability	Definite and continuous
Prevention	<p>Engineering controls that reduce sound exposure levels are available and technologically feasible for most noise sources. Engineering controls involve modifying or replacing equipment, or making related physical changes at the noise source or along the transmission path to reduce the noise level at the worker's ear. The same goes for vibration. The following should be considered:</p> <ul style="list-style-type: none"> ➤ Choose low-noise tools and machinery. ➤ Maintain and lubricate machinery and equipment (e.g. oil bearings). ➤ Enclose or isolate the noise source.
Mitigation Action	<p>Noise:</p> <p>The Occupational Safety and Health Administration (OSHA) guidelines set legal limits on noise exposure in the workplace. These limits are based on a worker's time weighted average over an 8 hour day. With noise, OSHA's permissible exposure limit (PEL) is 90dBA for all workers for an 8 hour day. The OSHA standard uses a 5dBA exchange rate. This means that when the noise level is increased by 5dBA, the amount of time a person can be exposed to a certain noise level to receive the same dose is cut in half.</p> <p>The WHO guideline on maximum noise levels to prevent hearing impairment set noise level limits at an average of 70 dBA over a 24 hour period with maximum noise levels not exceeding 110 dBA during the period. These latter limits would apply if the day time shift is prolonged beyond the 8 hour day.</p> <p>Mitigation actions include:</p> <ul style="list-style-type: none"> ➤ Operating noisy machines during shifts when fewer people are exposed. ➤ Limiting the amount of time a person spends at a noise source. ➤ Providing quiet areas where workers can gain relief from noise sources. ➤ Where possible, restricting worker presence to a suitable distance away from noisy equipment. (Controlling noise exposure through distance is often an effective, yet simple and inexpensive administrative control.) ➤ In open space, for every doubling of the distance between the source of noise and the worker, the noise is decreased by 6dBA. ➤ Hearing protection devices, specifically earmuffs for long periods of exposure in close proximity to sources and at all times use plugs for all places outside offices within the claims not near noise sources for extended periods ➤ PPE is considered an acceptable mitigation, but a less desirable option to control exposures to noise.

	<ul style="list-style-type: none"> ➤ Monitoring personnel's' hearing, before, during (each year if employed longer than one year) and after employment, as a minimum. <p>Vibration:</p> <p>Industry vibration regulations, set daily exposure limit values and action values for both hand-arm and whole body vibration for eight hour shifts. Personnel can work shorter shifts where conditions causing excessive vibration exist.</p>
Monitoring	<p>A mechanism to monitor noise levels, record and respond to health related complaints of personnel and mitigate impacts appropriately.</p> <p>Monitoring:</p> <ul style="list-style-type: none"> ➤ Record all health related incidents ➤ Survey noise and vibration levels annually <p>Performance Indicator:</p> <ul style="list-style-type: none"> ➤ Number of registered health complaints/incidences ➤ Occupational health policy is on file ➤ Noise monitoring plan is on file. ➤ Record all information in a biannual report.

Table 4. Health & Safety Management Programme – General Hazards and Potential Risk of Injury

Risk Event	Injury risks due to normal working conditions		
Description	<p>The potential impacts on human health and safety resulting from activities in any phase could include occupational accidents and injuries, vehicle accidents, exposure to weather extremes, trips and fall on uneven terrain, adverse health effects from dust generation and emissions, and contact with hazardous materials. The potential for these impacts to occur would be low because of the limited range of activities and number of workers required during operations. Gecko follows a set of industry-specific safety and health policies in the work place.</p> <p>Typical operational procedures that pose risks to operational personnel are:</p> <ul style="list-style-type: none"> ➤ Operating heavy machinery such as, front-end loaders, excavators and sieves ➤ Operating haulage trucks 		
Status	Negative		
Phases	Phases and specific activities or equipment during which personnel are exposed to health and safety risks will apply are highlighted below; Significance assessment was carried out on the operational phase which presents a long term exposure risk.		
Construction Phase	Operational Phase	Decommissioning Phase	Post Closure
Processing plant construction site	Processing plant operations	Dismantling processing plant	Personnel no longer on site. Public safety ensured through restricted access though quarry pit will remain.
Rock falls from steep and high cliff faces of quarry pit	Rock falls from steep and high cliff faces of quarry pit	Rehabilitation of slopes	
Large mobile plant equipment	Large mobile plant equipment and product haulage	Demolishing buildings	
Working at heights	Drilling & blasting	Constructing fences	
	Fire and explosion hazards		
Severity	Substantial deterioration. Recommended level will often be violated. Personnel potentially unable to work any longer.		
Duration	Permanent. Beyond closure. Long term.		
Spatial Scale	Localised - Within the site boundary.		
Probability	Definite and continuous		

Prevention	The removal of hazards or risks will possibly prevent accidents from occurring. However, it is not possible to remove all risks.
Mitigation Action	<p>It is not possible to prevent all incidents from occurring completely. An accident is an unplanned incident though it could have been foreseen if the necessary precautions had been taken. Not all hazards can be removed but the risk it presents can be lowered. An integrated health and safety management system acts as a monitoring tool and mitigating tool to reduce the risks. Typical mitigating measures within the health and safety management systems are:-</p> <ul style="list-style-type: none"> ➤ Draw up operational procedure manuals ➤ Provide health and safety awareness training ➤ Establish practical standard housekeeping rules ➤ Colour code certain areas, equipment and substances to thereby classifying the risks. ➤ Provide signage for personal protective equipment (e.g. protective clothing like safety boots and hard hats) ➤ Institute safe working procedures and require permits to work ➤ Devise and implement emergency response plans ➤ Provide easy access to Material Safety Data Sheets (MSDS) ➤ Provide first aid treatment and training ➤ Devise emergency medical procedures for all eventualities ➤ Undertake daily safety reminders and/or drills ➤ Establish regulations for handling fuel <p>The MSDS gives health related medical responses for personnel assisting staff who are exposed to the fuels.</p> <p>Procedures for dealing with injuries or accidents must be in place and all contact details for emergency personnel must be available.</p> <p>This list is not comprehensive and could be supplemented substantially by the Health & Safety Manager</p>
Monitoring	<p>Planning:</p> <ul style="list-style-type: none"> ➤ A register of all incidents must be maintained on a daily basis. This should include measures taken to ensure that incidents do not repeat themselves. ➤ An Emergency Response Plan should be developed. <p>Construction and Operations:</p> <ul style="list-style-type: none"> ➤ Monitoring reports on file ➤ Non-compliances reported and on file ➤ Operators certificates on file ➤ Schedule of road maintenance on file ➤ A register must be maintained of all training provided to staff. ➤ A register must be maintained for all safety equipment and medical supplies kept on site. This should include date of purchase and date of service/replacement for items that can expire or deteriorate with age. ➤ A register of all incidents must be maintained on a daily basis. This should include measures taken to ensure that incidents do not repeat themselves. ➤ File any incident reports. ➤ Include all monitoring information in the biannual environmental report.

Mine Closure:

At the time of mine closure and abandonment the contractor must rehabilitate the mine site to the state agreed upon at the start of the agreement. Comparisons with the baseline report drafted at the start of the relationship must be made.

- Removal of **contractor's** movable assets i.e. plant equipment
- Demolishment of **contractor's** fixed immovable assets
- Removal of this demolished plant and building rubble by **contractor**
- **contractor** to fence off dangerously deep pits or holes in the ground that poses a threat to the public safety
- In accordance with the rehabilitation plan the steep side slopes may need to be blasted to change angle of repose.

The **proponent** is to fulfil the same rehabilitation tasks as above for all the accessory works area, including infrastructure, pits and holes etc.

Table 5. Visual Management Programme

Risk Event	Changes to the aesthetic appeal of the area due to presence of people, vehicles and machinery. Visible changes to habitats due to human activities.		
Description	<p>The experience of enjoying the landscape free of human activities is considered highly desirable. Intrusions into the current scenery may be unwelcomed.</p> <p>Impact to visual resources would be considered unfavourable if the landscape were significantly degraded or modified. The presence of mine personnel, vehicles and other equipment may reduce the aesthetic appeal of the area.</p>		
Status	Negative		
Phases	Phases during which traffic, infrastructure and dust plumes which potentially play a role in visual nuisances are highlighted below; Significance assessment was carried out on the operational phase which presents a long term risk.		
Construction Phase	Operational Phase	Decommissioning Phase	Post Closure
Cranes used to build mine infrastructure	Processing plant infrastructure and Traffic	Dismantling infrastructure with cranes	Barren mountain slopes
Additional traffic on the district road and mine access roads	Processing plant, ore haulage and Blasting creating dust plumes	Denuded mountain slopes not revegetated	
Dust plumes caused by mobile equipment operating at the mine	Bear mountain slopes	Demolishing buildings causing dust plumes	
Severity	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints. Limited loss of resources.		
Duration	Reversible over time. Life of the project. Medium term		
Spatial Scale	Fairly widespread – Beyond the site boundary. Localised at best. Though this does depend on mobility of particles and prevailing weather conditions. The setting is rural and the only receptor currently is the farm homestead.		
Probability	Definite (in terms of dust plume creation from blasting) and continuous (in terms of the barren mountain slopes until revegetated during post closure)		
Prevention	<p>Dust creation cannot be prevented completely. Water is normally used to suppress dust on the roads. Blasting will be intermittent and the plume will dissipate fairly rapidly. The bare mountain slopes cannot be avoided.</p> <p>For operations to continue, personnel, vehicles and machinery will continue to operate within the area for the duration of the project. Not possible to operate and have no visual presence.</p>		

Mitigation Action	<p>Best practice methodologies for operations will be employed. These may include the following:</p> <ul style="list-style-type: none"> ➤ Existing roads and tracks are used to access the mine site. ➤ Careful planning to disturb significant floral and faunal habitats when accessing the mining site ➤ Training personnel regarding the visible signs of faunal and floral biodiversity and the avoidance of habitat disturbance. ➤ Minimise the footprint of personnel, vehicles and machinery ➤ Rehabilitate habitats through the removal of obvious signs of human presence. ➤ Removal of waste on a daily basis and disposal of waste in the appropriate manner. ➤ Removal of machinery from the mining sites if periods of inactivity are prolonged. <p>Often, the sites that are disturbed and rehabilitated at least from an aesthetic perspective will in time be recolonized by both plants and animals. The aim is to minimise the footprint so as to achieve the least impact due to anthropogenic influence.</p>
Monitoring	<p>Planning:</p> <p>Visual baseline in the form of a photo survey should be undertaken.</p> <p>Construction:</p> <ul style="list-style-type: none"> ➤ Carry out audits and report findings. ➤ Keep a visitors' log. ➤ Maintain existing access road. <p>Operation:</p> <ul style="list-style-type: none"> ➤ Visual baseline (2nd) in the form of a photo survey should be undertaken. ➤ Enforce strict rules on the use of lighting by personnel on site. <p>Decommissioning:</p> <ul style="list-style-type: none"> ➤ Requirements for restricting or prohibiting access to the abandoned mine are implemented and records on file. ➤ Final visual baseline (3rd) in the form of a photo survey should be undertaken.

Table 6. Stakeholder Communication Management Programme

Risk Event	Users and owners of the land could potentially experience restrictions to their constitutionally entitled liberties.		
Description	<p>The mining claims are situated on land belonging to the government of Namibia. The northern 60% of the claims fall within the Karibib Townlands. The southern 40% falls within the Resettlement Farm Okongava Ost. The Town Council are not using their portion for residential, industrial, recreational or agricultural purposes. The Farm portion is zoned for agricultural purposes and falls under responsibility of the Ministry of Land Reform (MLR).</p> <p>Historically, Mr. Berger started the mining activities a few decades ago, resulting in the creation of a quarry pit and ore stockpile within the south western portion of the western mining claim. Processing of the ore took place on the outskirts of the town's CBD (central business district). The quarry has been dormant for about ten years. Gecko Limestone registered the claims in their name in 2012 having purchased the rights from Mr. Berger.</p> <p>Applications have been made with the Town Council and the MLR to restart the quarry activities and processing of the ore within the claims. The Town Council has consented to allow the resumption of the mining activities conditional on the receipt of environmental clearance. The consent letter is included in Appendix L of the EIA report. MLR are yet to do a site visit and provide consent. The additional conditions laid down requires that the company draw up a memorandum of understanding so that day to day interactions can be guided effectively. The Ministry of Mines and Energy (MME) are the competent authority over mining claims. They too need to provide input regarding the claims as it pertains to the Minerals Act.</p>		
Status	Negative		
Phases	Phases during which potential conflicts may apply are highlighted below; Significance assessment was carried out on the operational phase which presents a long term risk. Aspects where potential conflicts may arise are listed.		
Construction Phase	Operational Phase	Decommissioning Phase	Post Closure
Access to site	Access to site	Access to site	Access to site
Visual impact	Visual impact	Visual impact	Visual impact
Access to groundwater resources / boreholes	Access to groundwater resources / boreholes	Access to groundwater resources / boreholes	Public safety
Public safety	Public safety	Public safety	Alternative uses for pit
Asset security	Asset security	Asset security	
Waste management	Waste management	Waste management	

Severity	Moderate / measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints. Noticeable loss of resources.
Duration	Reversible over time. Life of the project. Medium term
Spatial Scale	Fairly widespread – Beyond the site boundary. Localised at best.
Probability	Definite / continuous
Prevention	It is not possible to prevent all conflicts. Any unforeseen issues will be mitigated through the various mechanisms stipulated in the EMP
Mitigation Action	<p>The EMA requires that permission be provided by the competent authorities for the listed activity. The EIA process has facilitated a transparent process by which concerns can be raised. The PPP has ensured that all stakeholders have been informed. The proponent is subservient to the conditions laid down by the guidelines / conditions and the law that upholds it. The implementation of the mining programme will be in accordance with the approved Environmental Management Plan (EMP). This draft EMP was submitted to MME, MLR and MET.</p> <p>Maintaining good relationships with land owners is imperative so that the severity and duration of disputes can be kept low. A well-designed and well-implemented stakeholder engagement programme will cover the land use conflicts that could potentially arise. Actively engage landowners regularly to maintain open channels of communication</p>
Monitoring	<p>The following mechanisms should be included in the environmental management system as monitoring tools and performance indicators:</p> <ul style="list-style-type: none"> ➤ Correspondence and agreements - document filing system ➤ Review any memoranda of understanding annually ➤ Keep complaints register up to date ➤ Update stakeholder register regularly ➤ Fence off mining areas to increase public safety

Table 7. Stakeholder Communication Management Programme

Risk Event	Socio-Economic aspect of sustaining employment in the sector.		
Description	The mining to be carried out at the limestone mining claims will employ about 20 personnel to be employed by the contractor to manage the excavation, crushing, milling, screening and transportation processes. A security team of 3 personnel will also be employed. Families whose husbands can be permanently employed enjoy greater emotional and physical security.		
Status	Positive		
Phases	Phases during which mining activities may contribute to the local economy are highlighted below; The significance assessment was carried out on the operational phase which represents the longest term when benefits are greater.		
Construction Phase	Operational Phase	Decommissioning Phase	Post Closure
Construction personnel	Operational personnel	Demolition personnel	No employment
Security personnel	Security personnel	Security personnel	
Support services	Support services	Support services	
Severity	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.		
Duration	Reversible over time. Life of the project. Medium term		
Spatial Scale	Fairly widespread – Beyond the site boundary. Local		
Probability	Possible/ frequent		
Prevention	<p>Economic benefits could be prevented locally if no local residents are employed and all materials and equipment is imported from other towns in the region and beyond.</p> <p>Actions that will prevent the positive impact of employment creation for this project would be the no go alternative due to either a fatal flaw from a socio-economic or biodiversity impacts being of high significance.</p> <p>Retrenchment of permanently employed can be avoided by diversifying the business options in the construction industry.</p>		
Mitigation Action	At least 50% of the personnel should be hired from the local resident pool.		
Monitoring	<p>Provided local residents are hired then one can be more confident in achieving the medium significance. Through meaningful permanent employment economic development can be secured for all concerned.</p> <p>Include the employee statistics in the annual audit showing long term trends. Company annual production report</p>		

Table 8. Waste Management Programme

Risk Event	Waste Production		
Description	<p>Waste is generated during the construction, operational and decommissioning phases of the mine’s life. Waste can be classified into mineralised and non-mineralised waste. Non-mineralised waste can be classified as non-hazardous and hazardous waste. Medical waste is additional category.</p> <ol style="list-style-type: none"> 1. Non-Hazardous non-Mineralised includes: metal cut offs, rubber, wood, product packaging, organic materials, glass, plastics, food scraps, cardboard/paper, used PPE, etc. 2. Hazardous non-mineralised: Printer cartridges, sewerage, batteries, hydrocarbons (oils, grease), fluorescent, etc. 3. Medical waste: Syringes, material with blood stains, bandages, etc. 4. Mineral waste includes: waste rock, tailings from mineral processing, rejects from beneficiation or concentration of other minerals, refinery or processing discards and sludges, smelter and other furnace slags, ashes, etc. 		
Status	Negative		
Phases	Phases during which waste will be produced are highlighted below; Significance assessment was carried out on the operational phase which presents a long term risk. Receptors potentially affected by waste.		
Construction Phase	Operational Phase	Decommissioning Phase	Post Closure
Company personnel health	Company personnel health	Company personnel health	General public health
General public health	General public health	General public health	Groundwater
Groundwater	Groundwater	Groundwater	Biodiversity
Biodiversity	Biodiversity	Biodiversity	Soil
Soil	Soil	Soil	Atmosphere - dust and other volatiles emitted from waste are covered under air quality impacts but there is some overlap with waste management risks
Atmosphere	Atmosphere	Atmosphere	
Severity	Moderate / measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints. Noticeable loss of resources.		
Duration	Reversible over time. Life of the project. Medium term		

Spatial Scale	Fairly widespread – Beyond the site boundary. Localised at best.
Probability	Definite / continuous
Prevention	<p>Some waste products of categories 1-3 that can potentially impact the listed receptors can be managed to prevent impacts. Some actions and company commitments that can prevent the impacts include the following:</p> <ul style="list-style-type: none"> ➤ A waste management procedure should cover recycling, re-use, storage, handling, transportation and disposal ➤ Collection and disposal of waste must be effective enough to not impact any of the receptors ➤ If waste must be stored and separated on site then the activities must take place on sealed surfaces, within bunds and fenced areas, and made ready for transport off-site by packaging the waste in sealed containers
Mitigation Action	<p>Where waste product impacts on the receptors cannot be prevented the preventative measures above should still be employed so as to mitigate or reduce the impacts. Mitigations for the various receptors include the following:</p> <ul style="list-style-type: none"> ➤ Personal protection equipment (PPE) can protect personnel from exposure to disease or toxic chemicals ➤ Awareness training for company personnel and the general public will inform them of those wastes that may cause harm, pollute the soil, groundwater or air (if particulate) ➤ Some wastes are dangerous to fauna and flora; Animals should not be able to access the waste management area; waste must be contained so that it cannot enter the naturally vegetated areas beyond the accessory works area. ➤ Containerisation of highly volatile wastes should be actioned to reduce emissions but not so effectively that creates explosive risks if pressures build up. The latter may occur if the containers are stored outside in the heat of the sun. <p>A waste management programme should keep records in the form of an inventory of waste products collected, sorted, stored, recycled, reused or disposed. Certificates for disposal of hazardous waste should be filed.</p> <p>The mineral waste (category 4 above) will most likely only be waste rock that cannot be processed for product. This waste rock will be dumped or stockpiled on site and be used in the rehabilitation at decommissioning.</p>
Rehabilitation	<p>In the mitigation hierarchy, rehabilitation may be required if the mitigations are not implemented properly and there is compromise in proper procedure or an accident occurs during the process of collection, storage or disposal of waste. As a result, one of the receptors may be impacted. Consequently the following examples of rehabilitation may be required:</p> <ul style="list-style-type: none"> ➤ A person who is exposed to disease or toxic waste, which results in harm, will need medical attention

	<ul style="list-style-type: none"> ➤ Soil which is contaminated by used hydrocarbons needs to be relocated to a remediation cell where the addition of fertiliser, air and water will within a year be suitable for re-use. ➤ In the event of groundwater contamination by chemicals or hydrocarbons, the sinking of a borehole or the excavation of a pit in the vicinity of the contaminate source will allow the pumping of the groundwater into a holding dam. Through the continued pumping a cone of depression will draw the contaminated water towards the pump. The collected contaminated water can be discarded at a registered hazardous waste site or if separable the contaminant can be removed from the water before disposal. The reclaimed water could be pumped back in the pit or borehole. <p>If the mitigation hierarchy is followed through to rehabilitation then the resultant consequence could be insignificant. A well designed and well implemented waste management programme will provide the necessary confidence that the risks to receptors will be of low significance.</p>
Monitoring	<p>Planning:</p> <ul style="list-style-type: none"> ➤ Waste Management Plan on file. ➤ Accessory works application submitted and receipt kept on file. ➤ Accessory works plan on file. ➤ Application for effluent discharge submitted to competent authority and receipt on file. ➤ Maintenance plan on file. <p>Construction:</p> <ul style="list-style-type: none"> ➤ Monitor compliance and file report. ➤ Hazardous waste certificate from hazardous waste dump on file. <p>Operations:</p> <p>Monitoring:</p> <ul style="list-style-type: none"> ➤ Regular inspection of waste collection and disposal areas. ➤ Check and file waste disposal slips. ➤ Compile all monitoring information in an annual report and audit this report against the waste management plan. ➤ Emergency Response Plan on file. ➤ Hazardous waste disposal certificate on file. ➤ Monitor maintenance workshop and wash bays for compliance and file reports. <p>Performance Indicators:</p> <ul style="list-style-type: none"> ➤ Availability of plan ➤ Extent to which plan is complied with ➤ Presence of litter within the area and surrounding land ➤ Availability of rubbish bins and skips ➤ Total volume of general and hazardous waste storage capacity ➤ Total volume of general and hazardous waste stored on site ➤ Degree to which different waste is separated ➤ Frequency of waste collection

	Decommissioning:
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	Monitor compliancy and report on file.
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Table 9. Ecological Management Programme

Risk Event	Mining activities may affect biodiversity of fauna and flora directly or through habitat alteration.		
Description	<p>Through the mining of dolomitic limestone there is potential for impacting the diversity of species within the various habitats by reducing population numbers of certain species within the mining claims. Pressures on the population numbers can potentially lead to a reduction of a population within an area causing the species to no longer exist within that area. Should a species be endemic to that same area then the risk of extinction is high. Habitats can be severely altered potentially changing the type of habitat or leading to the removal of micro habitats.</p> <p>No specialist fauna and flora studies have been commissioned for the mining claims. However, the site visits and reference to studies carried out elsewhere in the area reveals that the habitat and the flora present in the claims are not endemic to claims but are common throughout the Karibib District. Faunal biodiversity, though dependent on these habitats in the claims, is relatively more mobile and less likely to be impacted by the mining activities.</p>		
Status	Negative		
Phases	Phases during which mining activities may impact the ecology and biodiversity are highlighted below; The significance assessment was carried out on the operational phase which presents a long term risk.		
Construction Phase	Operational Phase	Decommissioning Phase	Post Closure
Flora	Flora	Flora	Flora
Fauna	Fauna	Fauna	Fauna
Habitat	Habitat	Habitat	Habitat
Severity	Moderate / measurable deterioration. Noticeable loss of resources.		
Duration	Reversible over time. Life of the project. Medium term		
Spatial Scale	Localised - Within the site boundary		
Probability	Possible/frequent		
Prevention	Not possible as at least many specimens of the most common taxa found in the district will be removed during construction activities and quarry pit expansion.		
Mitigation Action	The mining activities will alter the habitats that previously existed. Soil and flora will be removed. Majority of fauna will relocate and compete for resources in adjacent habitats. Mitigating & rehabilitation mechanisms are imperative.		

	<p>The planned spatial extent of the excavation is about 20m wide, 20m deep and 1200m long. This amounts to about 14% of the claim areas. The claims mainly span the white elevated ridge which constitutes one type of habitat. On the southern side of the ridge there ridge habitat transitions into a savanna type habitat which is common to the plains which span the areas between the mountains and ridges of the Karibib district. Less than 300m south the claims an ephemeral river flows towards the west and crosses the district road at the turn off to the mine site. The 20m wide excavation will skirt the southern portion of limestone ridge where the dolomite target dips along an anticline down below the landscape. This means that the habitat area that will be affected will leave ample mountain habitat for the <i>Commiphora</i> trees habitat. Fauna will still be able to move freely along the ridge along the east west axis.</p> <p>The accessory works area for waste rock dumps, product stockpiling, the processing plant, workshops and offices will be allocated to permanent operational sites for the mine's life. Thus, the footprint of the mining activities will not impact on all the area within the claims. The planning of the mine layout must endeavour reduce the footprint to a minimum without compromising the realistic needs of the business operation and making decisions that will safeguard against indiscriminate habitat alteration. If any top soil exists then this should be stockpiled for use during rehabilitation.</p> <p>Awareness training for personnel will focus on:</p> <ul style="list-style-type: none"> ➤ Training all personnel to limit the habitat alteration during the construction and operational phases of the mine ➤ Teach knowledge and understanding of the fauna and flora and their ecology <p>The following basic rules should be adhered too:</p> <ul style="list-style-type: none"> ➤ No killing or capturing of animals ➤ No littering ➤ No speeding ➤ Driving only on existing roads (national roads and roads created by the mine inside the gravel mining area. ➤ No collection of fire wood; the Forestry Act makes it an offence to harm or damage any plant in or within 100m of a river-course;
Rehabilitation	<p>The scope of the rehabilitation at mine closure could be applied to the accessory works areas as defined above. However, it is not expected that the quarry pit itself can be filled up. There might be a possibility to terrace or slope the sides of the pit to enhance safety but this planning must become part of the mine closure plan. The following aspects should be considered when finalising the mine closure plan:</p> <ul style="list-style-type: none"> ➤ The waste rock dumps should be used to landscape certain aspects of the accessory works area. ➤ The stockpiled soil should be used to cover areas for the re-establishment of natural vegetation.

	<ul style="list-style-type: none"> ➤ Funds for rehabilitation should be set aside from the start of the operational phase. ➤ Reasonable and acceptable ways of rehabilitation should be implemented on an ongoing basis as well as at the time of site closure. ➤ A plant nursery for running trials should be established at the start of the operational phase. <p>If the mitigation hierarchy is followed through to rehabilitation then the resultant consequence could be insignificant. A well designed and well implemented rehabilitation programme will provide the necessary confidence that the altered habitats could be rehabilitated at mine closure to a degree that the final footprint of the mine will be acceptable.</p>
Monitoring	<p>Planning:</p> <ul style="list-style-type: none"> ➤ List of plant species expected to occur within the area is on file. ➤ Bush clearing permit must be applied for prior to clearing of any areas. ➤ Environmental Clearance Certificate is on file ➤ Schedule for developing EMS documentation is on file. ➤ Visual baseline imagery to indicate which plant species preferred which habitats. ➤ Train personnel regarding the impact on the surrounding habitats. ➤ Plan mine layout to reduce the footprint size and thereby conserve more biodiversity <p>Construction & Operation:</p> <ul style="list-style-type: none"> ➤ Monitor compliance and file report. ➤ Mine closure plan to be developed and put on file. ➤ Rehabilitation of cleared areas to be planned and put on file. (use baseline imagery for planning) <p>Decommissioning:</p> <ul style="list-style-type: none"> ➤ Monitor compliance and file report. ➤ Compare final revegetation layout with visual baseline imagery

Table 10. Water Resource Management Programme

Risk Event	Mining activities may affect water resources through over utilisation or contamination		
Description	<p>Water will be needed for drinking and mine processing. Water could be sourced from Okongava Ost Farm which has a well at the homestead about 1.5 km from the mining claims. Alternatively, water could be conveyed to the mining claims from the Karibib town supply either by truck or pipeline. The feasibility of each option must be weighed up. This depends largely on the supply capabilities of the source and the demand of the mine. Typically, the water demand for the mine site will be at least 5000m³ per month.</p> <p>Water is a scarce resource and needs to be used sustainably. Groundwater reserves should not be depleted below an acceptable level if boreholes are used.</p> <p>The groundwater or infrequent surface water flow (adjacent river) is at risk of contamination by sewerage, chemicals and hydrocarbons that are not contained properly.</p>		
Status	Negative		
Phases	Phases during which mining activities may impact the water resources are highlighted below; The significance assessment was carried out on the operational phase which represents the longest term where risks are present.		
Construction Phase	Operational Phase	Decommissioning Phase	Post Closure
Surface water (ephemeral rivers)	Surface water (ephemeral rivers)	Surface water (ephemeral rivers)	Receptors should no longer be at risk as abstractions should have ceased and all potential contamination sources would have been removed
Groundwater (via borehole abstraction or unconsolidated soils and rock fractures)	Groundwater (via borehole abstraction or unconsolidated soils and rock fractures)	Groundwater (via borehole abstraction or unconsolidated soils and rock fractures)	
Severity	Substantial deterioration (death, illness or injury). Recommended water levels level could often be violated. Irreplaceable loss of resources should the groundwater be contaminated.		
Duration	Permanent. Beyond closure. Long term.		
Spatial Scale	Fairly widespread – groundwater and surface water can potential convey impacts beyond the boundary of the mining claims		
Probability	Definite / continuous		
Prevention	Water abstraction from a borehole can be stopped immediately when the permit stipulated depth is reached. This will prevent overutilization of the resource. Pollutants entering the groundwater and surface water receptors		

	<p>can be prevented. In reality, this would mean that any pollutants brought to site must be handled in such a way that no accidental spillages onto the ground occurs. In practice, the probability of this being humanly possible is slim. By definition, accidents happen.</p>
Mitigation Action	<p>With regards water abstraction from boreholes, a continuous monitoring programme is required so as to manage the water level fluctuations sustainably. Abstraction must be stopped if the sustainable use cannot be maintained.</p> <p>To mitigate against the accidental spillage of pollutants it is necessary to construct sealed surfaces with drains (eg. oil water separators in the case of hydrocarbons) and bunds. These serve for dispensing or distribution sites and storage sites respectively. Drip trays are another example of a means to prevent spillage onto the ground when emergency maintenance work can only be carried out away from the designated areas.</p>
Rehabilitation	<p>Should the water levels in the boreholes not re-establish a level which was measured at the start of the mining operations and it can be shown that this is due to mining activity alone and due to other factors, then active recharge maybe required. Water Affairs would need to advise on the method and whether this will be effective.</p> <p>Any polluted soil, surface water receptors or groundwater will need to be rehabilitated:</p> <ol style="list-style-type: none"> 1. Soil can be remediated or disposed of at a registered hazardous waste site 2. Surface water receptor (standing or flowing water to be impounded and pollutant separated if possible, or sandy substrate of riverbed removed and remediated or disposed as above) 3. Groundwater abstracted at site of pollution until no pollutants remain (in case of hydrocarbon fuel the fuel can be separated and the water cleaned and used for grey water applications) <p>If the mitigation hierarchy is followed through to rehabilitation then the resultant consequence could be insignificant. A well designed and well implemented mitigation programme alone should provide for a low significance. Rehabilitation will provide greater confidence that if polluted, the receptors could be rehabilitated before or at mine closure.</p>
Monitoring	<p>Planning:</p> <ul style="list-style-type: none"> ➤ Waste Management Plan on file ➤ Application for effluent discharge submitted to competent authority and receipt on file ➤ Apply for water abstraction permit ➤ Keep water abstraction permit and effluent discharge permit on file <p>Construction & Operations:</p> <ul style="list-style-type: none"> ➤ Monitor compliance and file report ➤ All certificates for hazardous waste disposal filed.

	<ul style="list-style-type: none">➤ Checklists and schedule for auditing compliance to the EMP are filed.➤ Reports are filed.➤ Awareness training attendance lists signed and filed➤ Monitor oil water separators, oil sumps, bunds and assess compliance and file reports.➤ Monitor water use and report on file. <p>Decommissioning:</p> <ul style="list-style-type: none">➤ Monitor rehabilitation and report on file.
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Table 11. Mine Closure & Rehabilitation Management Programme

Risk Event	Abandonment of the mining site potentially exposes public and wildlife to hazards
Description	<p>When a mining area is abandoned the infrastructure and altered landscape can affect the safe access of wildlife and general public if not rehabilitated. The altered habitat may or may not promote the re-establishment of organisms once found there. Visual rehabilitation to the original state is not always practical due to economic factors.</p> <p>If the mitigation hierarchy is followed through to rehabilitation then the resultant consequence could be insignificant or at worst a low significance. A well designed and well implemented mine closure plan should provide for a low significance upon mine closure.</p> <p>Risks associated with abandoning a mine without rehabilitating according to an approved plan:</p> <p>Minerals Act: Section 54</p> <p>Any person who contravenes or fails to comply with the provisions of subsection (2) shall be guilty of an offence and on conviction be liable to a fine not exceeding R8 000 or to imprisonment for a period not exceeding 12 months or to both such fine and such imprisonment.</p> <p>Contractual Agreements</p> <p>The Contractor’s failure to meet the obligations as stipulated in the contractual agreement with regards to rehabilitation will incur penalties to the value of the cost of rehabilitating the quarry and works area to a state agreed upon by the Contractor and Proponent at the start of the contractual agreement.</p> <p>Minerals Act:</p> <p>Section 54</p> <p>Abandonment of mining areas</p> <p>The holder of a mineral licence may abandon the mining area by notice in writing addressed and delivered to the Commissioner who in turn will notify the license holder that the mine has been abandoned as from the date of the cancellation notice.</p> <p>(2) The holder of the mineral licence to which such area relates shall:</p> <ul style="list-style-type: none"> ➤ demolish any accessory works erected or constructed by such person in such area, except in so far as the owner of the land retains such accessory works on such conditions as may mutually be agreed upon between such owner and person and remove from such land all debris and any other object brought onto such land; ➤ take all such steps as may be necessary to remedy to the reasonable satisfaction of the Minister any damage caused by any mining

	<p>operations carried on by such holder to the surface of, and the environment on, the land in the area in question.</p> <p>➤ The abandonment of a mining area shall not affect any legal proceedings instituted against such holder or any obligation or liability of such holder in terms of the provisions of the Act.</p>		
Status	Negative		
Phases	<p>Phases during which decommissioning and mine closure may impact public safety, future ecosystem functioning for domestic livestock and wildlife, economic stability and social health, and asset security. The significance assessment is carried out for the post closure phase.</p> <p>In terms of economic benefits lost, it is important to note that the longer the mine stays open the longer the benefit to the community which if the mine did not start up would not have been realised in the first place.</p>		
Construction Phase	Operational Phase	Decommissioning Phase	Post Closure
Not applicable	Not applicable	Ecosystem functioning	Ecosystem functioning
		Public safety	Public safety
		Economic uncertainty	Social challenges of unemployment
		Asset security	
Severity	Substantial deterioration after mine closure with respect to aspects listed above.		
Duration	Permanent. Beyond closure. Long term.		
Spatial Scale	Fairly widespread – Beyond the site boundary. Local		
Probability	Definite / continuous		
Prevention	<p>The resources are finite and so decommissioning is inevitable at some point. The degree to which the impact of closure will have will depends on the mitigations that can be considered.</p> <p>Ecosystem functioning of the whole area cannot return to baseline conditions unless the excavated quarry is refilled and the area revegetated to baseline conditions. This is not practical and will not be carried out.</p> <p>Public harm can be prevented provided the area is secured and the risky hazards are inaccessible.</p> <p>Jobs within this sector will be lost. This cannot be prevented unless the employees move with the company to the next site.</p> <p>Theft and damage to equipment can be prevented during the decommissioning phase provided good security prevents any form of criminal behaviour by disgruntled employees.</p>		

<p>Mitigation Action</p>	<p>Visual impacts can be mitigated through a thorough removal of all infrastructure.</p> <p>The reduction in the size of the mine footprint during operations and decommissioning increases the probability that more habitat will become fully functional when the mine closes.</p> <p>Secure fencing around the hazardous quarry pit could prevent accidents from occurring but the permanent and visually acceptable barrier to humans and wildlife would be required to prevent injuries due to falling from heights. Access down into the pit could be allowed provided there is no risk from falling rocks.</p> <p>Alternative sources of income from the mining claim area could provide alternative sources of income. The establishment of a plant nursery during the life of mine for the purpose of revegetating rehabilitated areas, could remain functional after closure and sell indigenous shrubs and trees to the public and other nurseries around the country. This would also mean that a continued presence at the mine site will further secure public safety.</p> <p>Some infrastructure could remain if alternative uses for buildings could be found.</p> <p>All of these aspects need to be planned during the operational phase and the strategy documented in a mine closure and rehabilitation plan</p>
<p>Rehabilitation</p>	<p>Reasonable rehabilitation of the mine site should take place. The mining company will be responsible to set aside funds for rehabilitation.</p> <p>Rehabilitation of the abandoned mining area will amongst other things include the following:</p> <ul style="list-style-type: none"> ➤ All movable assets to be removed off site ➤ All waste to be removed from site ➤ All immovable machinery to be dismantled and removed from site ➤ Possibly create shallow sloped sides of quarried areas ➤ Waste rock dumps to be used in landscaping ➤ All stockpiled topsoil will be re-laid on the landscaped areas (this is a limited resource and only exists on the southern boundary of the claims away from the rocky ridge) ➤ Designed landscaped areas to be revegetated with plants from the nursery ➤ Finally erect fencing or barriers to prevent access by public or animals to cliff faces of the quarried pits
<p>Monitoring</p>	<p>At the time of quarry closure and abandonment the contractor must rehabilitate the mine site to the state agreed upon at the start of the agreement. In general as discussed above the following must be monitored:</p> <ul style="list-style-type: none"> ➤ Removal of movable assets i.e. plant equipment ➤ Demolishment of fixed immovable assets ➤ Removal of this demolished plant and building rubble

	<ul style="list-style-type: none">➤ Fence off dangerously deep pits or holes in the ground that pose a threat to the public safety➤ The proponent is to fulfil the same rehabilitation tasks as above for all the accessory works area, including infrastructure, tailings, pits and holes etc. which they created before the contractor began works in the quarry area.➤ A mine closure and rehabilitation plan and associated checklists must be followed and signed off at each stage of the mine closure/rehabilitation process.
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