KUNENE BUILDING SUPPLIES

Quarrying Operation for the Construction and Road Building Materials near Omakange Settlement, Kunene Region

ENVIRONMENTAL MANAGEMENT PLAN

Prepared for: Kunene Building Supplies CC

MEFT Application No. APP-003233

Ekwao Consulting

PROJECT TITLE:

Quarrying Operations for the Construction and Road Building Materials from Two Borrow Pits and a Hard Rock Quarry on outskirts of Omakange Settlements Kunene Region

Environmental Management Plan

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ABBREVIATIONS AND ACRONYMS

BID ----------Background Information Document
BP ---------- Borrow Pit
BPs ----------Borrow Pits
CIF---------- Construction Industry Federation of Namibia
COVID-19 ---------- 'CO'- Corona, 'V1' - Virus & 'D' – Disease of 2019
DoW ----------Department of Works
ECC ----------Environmental Clearance Certificate
EIA ----------Environmental Impact Assessment
EMA ---------- Environmental Management Act
EMP ----------Environmental Management Plan
GPS ----------Global Positioning System
GRN ---------- Government of the Republic of Namibia
ha ---------- hectare (1 ha = 10 000 m^2)
HPP ----------Harambee Prosperity Plan
HRQ ----------Hard Rock Quarry
IAP's ----------Interested and Affected Parties
KBS---------- Kunene Building Supplies CC
KR ---------- Kunene Region
m^2 ---------- square meters (10 000 m^2 = 1 ha)
m^3 ----------cubic meters (1 m^3 of aggregate = 1500 kg or 1.5 ton)
MEFT ---------- Ministry of Environment, Forestry and Tourism
MHSS ----------Ministry of Health and Social Services
NDP5---------- National Development Plan 5
NHC ----------National Heritage Council
NSI ---------- Namibia Standards Institute
PPE ---------- Personal Protective Clothing
PPP ----------Public Participation Process
RA ----------Roads Authority
RFA ---------- Road Fund Administration
RCC ---------- Roads Constructor Company
VCF ---------- Veterinary Cordon Fence
UNFCCC ---------- United Nations Framework Conversion on Climatic Change

Names of Roads	
B1	The name of longest route in Namibia starting from the Noordoewer border in the south to the border at Oshikango via the towns of Windhoek, Okahandja, Otjiwarongo, Tsumeb, Omuthiya and Ondangwa.
B2	The name of the route from Okahandja to Walvis Bay via Karibib, Usakos and Swakopmund.
C35	The name of route from Henties Bay to Ruacana via Uis, Khorixas, Kamanjab and Omakange.
C41	The name of the route from Oshakati to Opuwo via Okahao and Omakange.
MR67	The main road from Kamanjab to Omakange - now known as C35.
MR100	The main road from Omakange to Opuwo - now known as C41.
MR122	The main road from Oshakati to Onhuno via Endola settlements - now known as C41.
MR123	The main road from Omakange to Okahao - now known as C41.

GLOSSARY OF TERMS AND DEFINITIONS

Aggregate:
Aggregate is defined as granular raw materials consisting of gravels, crushed stones, recycled concrete stones, building and plaster sand. Primarily, aggregates are used in the manufacturing of construction products which in turn are used widely in the built environments and road transport infrastructures. When using a square sieve with an aperture of 4.75 mm, 90% of sand will pass through a square sieve whilst at least 90% of coarse stone will be retained by such a sieve. The coarse stones retained on the sieve will constitute aggregates.

Anthropogenic Impact:
Human impacts on the environment which include changes to the biophysical environments, ecosystems, biodiversity and natural resources caused directly or indirectly by human activities including global warming, environmental degradation, etc.

Biodiversity:
The variability among living organisms from all sources including terrestrial marine and other aquatic ecosystem and ecological complexes which they are part of

Cumulative Impact
In the context of mining, means the impacts of mining activities which in themselves may not be significant but may become significant when added to the existing and potential impacts resulting from similar or diverse activities or undertaking in the area.

Decommissioning:
The process which begins after termination or cessation of mining activities or mineral processing and ends with closure. It involves, amongst others, the removal of unwanted infrastructures, making safe of the dangerous excavations and surface restoration so as to minimise the adverse environmental impacts of mining activities remaining after cessation of operation.

Environment:
All physical, chemical and biological factors and conditions which influence an object and or organism. It is also defined as the surroundings within which human beings exist and is made up of the land, water, atmosphere, plants and animal life (micro and macro) including interrelationships between the factors and the physical or chemical conditions that influence human health and well-being

Environmental Impact:
Environmental impact is any change to the environment whether adverse or beneficial, wholly or partially, resulting from an organization activities, products or services

Environmental Management Plan (EMP):
A working document on environmental and socioeconomic mitigation measures which must be implemented by several responsible parties during all phases of a proposed development.

Gravel Reserve:
A reserve is that amount of the resource which has been quantitatively proven through drilling and other sampling methods for which the level of confidence is high.
Gravel Resource:
The extent of extractable volume is estimated with a low level of confidence, i.e. the resource is only inferred (estimated) from geological evidence and assumptions but has not been verified via drilling and other applicable sampling methods.

Red Line:
The Red Line, also referred to as the **Veterinary Cordon Fence** (**VCF**) is a livestock disease control fence separating the northern regions from the central and southern regions.

Sensitive Area:
A sensitive area or environment is described as an area or environment where a unique ecosystem, habitat for plant and animal life, wetlands or conservation activity exists or where there is high potential for ecotourism.

1.0 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

1.1 Introduction

The proponent, Kunene Building Supplies (KBS) would like to revive quarrying operations for the purpose of producing construction and road building materials from two Borrow Pits (BPs) and one Hard Rock Quarry (HRQ) that are situated on the outskirts of the Omakange settlement in the Kunene region. KBS has appointed Ekwao Consulting (Ekwao) to handle its application process to obtain an Environmental Clearance Certificate (ECC) from the Ministry of Environment, Forestry and Tourism (MEFT).

This Environmental Management Plan (EMP) has been prepared by Ekwao in order to address the negative impacts associated with the quarrying operation. At this juncture, it imperative to point out that the quarrying operations contemplated are brownfield operations which were established many years ago before the enactment of Environmental Management Act (EMA) in Namibia. Therefore, there was no EIA conducted prior to commencing with such activities.

1.2 Objectives of the EMP

The EMP is compiled to serve as a standalone plan to manage and to safeguard the environmental impacts associated with the quarrying of construction and road building materials by KBS.

The underlying objective is to ensure that all possible negative impacts associated with the envisaged quarrying operation are considered and mitigation measures proposed. The ultimate objective is to ensure that the operation is carried out, in a manner which is technically feasible, socially acceptable and environmentally sustainable.

Recommendations and guidelines have been provided according to which compliance monitoring can be done during the **Operational** and **Decommissioning phases** of the quarrying operation. The EMP is a dynamic document, flexible and responsive to new and changing circumstances i.e. it should therefore be revised, updated and amended as and when required.

This EMP is binding on KBS Management, to all its current and future employees as well as to any third parties who may be hired to perform certain functions at the quarrying operation from time to time.

1.3 Acceptance of EMP

The acceptance of the EMP and the granting of an ECC will confer a legal obligation to KBS to comply with the recommendations contained in the document. Should the proponent fail to comply with such recommendations, it is deemed a contravention in terms of EMA, and, as such, is criminally prosecutable.

This EMP includes all relevant documentation contained in it, or referred to, within it, along with any amendments, appendices or annexures. Any substantial changes, updates or revisions to the EMP must be submitted to MEFT for the endorsement and approval of the Environmental Commissioner.

1.4 Environmental Policy

Based on the criteria provided in this EMP, KBS is expected to establish an overarching, environmental policy that defines the objectives of its quarrying activities that will ensure sound environmental and social performance. The objective of the said policy is to help KBS to comply with applicable laws and regulations related to environmental and social assessment and management processes.

Furthermore, the environmental policy will help KBS to embrace the principles of sustainable development by having the following aspects embodied in such an environmental policy:

- To conduct its operation in a manner that minimises environmental risk, and wherever practicable, eliminates adverse environmental impacts.
- To encourage continual improvement of environmental performance including regular review and setting of environmental objectives.
- To enhance amenity values by developing clear and effective waste handling and disposal methods.

- By striving to prevent pollution associated with the operation through the use of Best Available Technology (BAT) solutions.
- To encourage efficient use of energy including making appropriate use of alternative fuels where feasible.
- To strive to reduce greenhouse gas emissions from its operations and facilities.
- To cultivate a culture of having an open and constructive engagement with the communities in which it operates.
- To protect and where possible, to enhance biodiversity values at and around the quarrying facility.
- To protect the health, and to ensure the safety of its employees and the general public.

2.0 THE LEGAL FRAMEWORK

The Republic of Namibia has five tiers of law and a number of policies relevant to environmental assessment and protection which includes the following:

- The Namibia Constitution
- Statutory law
- Common law
- Customary law, and
- International law

Relevant policies to the study are:

- The EIA Policy (1995)
- The National Climate Change Policy of Namibia (September 2010)
- The Minerals Policy of Namibia (2004)
- Policy for the Conservation of Biotic Diversity and Habitat Protection (1994)
- The National Development Plans (NDP5)
- The National Resettlement Programme
- The Affirmative Action Loan Scheme Policy
- The National Land Policy
- The National Land-Use Policy
- Land Tax Regulations
- Resettlement Land Act
- The Harambee Prosperity Plan of 2015

As the main source of legislation, the Constitution of Namibia (1990) makes provision for the creation and enforcement of applicable legislation. In this context and in accordance with its constitution, Namibia has passed numerous laws intended to protect the natural environment and to mitigate against adverse environmental impacts.
The environmental regulations are guided and implemented by the Environmental Commissioner who heads the Department of Environmental Affairs (DEA) within the Ministry of Environment, Forestry and Tourism.

In addition, the following International Conventions, which in respect of Section 144 of the Constitution automatically form part of the Namibian law, may also apply:

- The Convention on Biodiversity (1992)
- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)
- The United Nations Framework Convention on Climate Change (UNFCCC)
- The Vienna Convention for the Protection of the Ozone Layer (1985)
- The Montreal Protocol on Substances that Deplete the Deplete the Ozone Layer (1987)

TABLE 1: LAWS, POLICIES & REGULATIONS APPLICABLE TO LISTED ACTIVITY											
Laws & Policies	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
The Constitution of Namibia	x	x	x	x	x	x	x	x	x	x	x
Minerals (Prospecting & Mining) Act, Act 33 of 1992	x									x	
Environmental Management Act , Act 7 of 2007	x	x	x	x	x	x	x	x	x	x	x
Regulations of the Environmental Management Act, Act 7 of 2007	x	x	x	x	x	x	x	x	x	x	x
Water Resource Management Act, Act 11 of 2013	x							x			
Explosives Act of 26 of 1956 of South Africa as Annotated Statutes	x	x		x		x					x
Nature Conservation Ordinance No. 14 of 1975								x			
Atmospheric Pollution Prevention Ordinance No. 11 of 1976		x	x					x			x
EA Policy for Sustainable Development and Environmental Conservation	x	x	x	x	x	x	x	x	x	x	x
Pollution Control and Waste Management Bill (Draft of Sept 2003)		x	x	x				x			x
Hazardous Substance Ordinance No. 14 of 1974	x	x	x	x				x	x	x	x
Labour Act No. 6 of 1992 - Health and Safety Regulations		x	x	x	x	x	x	x		x	x
Public and Environmental Health Act No. 86 of 2015		x	x	x	x	x	x	x	x	x	x
Agricultural (Commercial) Land Reform Act, Act 6 of 1995	x						x			x	

Legend

A	Use of Natural Resources	G	Land Use
B	Emission Impact (Air & Odour)	H	Biodiversity
C	Emissions (to Land & Hazard)	I	Archaeological, Cultural and Heritage Impacts
D	Noisy Impacts	J	Socio-economic Impacts
E	Visual Impacts	K	Health and Safety Impacts
F	Vibrations		

3.0 IMPLEMENTATION OF THE EMP

The following mechanisms are proposed for the implementation of the EMP:

- Roles and Responsibilities
- Compliance and non-compliance
- Environmental awareness training
- Communication
- Monitoring and Reporting
- Reviews
- Environmental emergencies, incidents and accidents
- Complying with mitigation measures

3.1 Roles and Responsibilities

The EMP is a recurring process that converts mitigation measures into actions and through monitoring, auditing, review and corrective action, ensures conformance with the overall aims and objectives of the quarrying operation.

Whilst the overall responsibility for the implementation of the EMP is vested in KBS Management, a number of individuals and entities are expected to fulfill various roles and responsibilities throughout the lifespan of the operation. In **Tables 2 & 3** below, are the roles and responsibilities that various parties will play with respect to the implementation of this EMP:

TABLE 2: ROLES & RESPONSIBILITIES - MEFT

The Environmental Management Act (EMA) (Act No. 7 of 2007) is implemented by the Ministry of Environment, Forestry and Tourism (MEFT) and the Environmental Commissioner is a statutory officer responsible for ensuring and enforcing compliance with the relevant environmental legislations.

Amongst the roles and responsibilities of MEFT are:

- Granting of the ECC.
- Ensuring overall compliance with the terms of the ECC.
- Reviewing of the EMP document and any revisions thereof.
- Undertaking site inspections and audits at their discretion.
- Reviewing Audit Reports.
- Reviewing Incident Reports.
- Enforcing legal mechanisms for contraventions of the EMP.
- Cancelling of an ECC on grounds on non-compliance.
- Renewing of the ECC.
- Issuing warnings and reprimands.

TABLE 3: ROLES AND RESPONSIBILITIES – KBS MANAGEMENT

During the operational (business phase) and decommissioning phases of the BPs and HRQ, the overall management and responsibilities of the quarrying operation will be vested in KBS Management. In turn, KBS is expected to appoint someone as a Quarry Manager who should be suitably qualified, skilled and experienced.

Amongst the roles and responsibilities of the **Quarry Manager** are the following:

- To manage the day-to-day operational activities for the production of construction and road building materials from both BPs and the HRQ and to ensure that such activities are executed in compliance with the relevant legislations and the terms of the EMP.
- To ensure that the necessary environment authorizations and permits are obtained and kept on file at the site office.
- To maintain the general communications with stakeholders and authorities and to inform on any planned activities where relevant.
- To report any significant environmental incidents, accidents and or emergencies to the relevant local authority.
- To ensure that all vehicles used in the operated that are on public roads are licensed and fully compliant with road regulations.
- To facilitate the appointment of at least two Safety Officers, one in charge of the BPs and the other in charge of HRQ.
- To undertake induction training for all existing personnel and those who may be hired in future to ensure that the environmental values, potential impacts, management measures and emergency responses are understood and implemented.
- To undertake monthly inspections of the BPs and HRQ for the purpose of assessing on-site implementation of the EMP and to ascertain the effectiveness of the prescribed mitigation measures.
- To perform internal audits and to prepare an environmental report once yearly for submission to MEFT.
- To act as a company liaison officer, responding to any queries and or complainants received from the members of the public.
- When conducting the EMP induction training, the presentation should be conducted, as far as possible, in the employees' language of choice.

3.2 Compliance and non-compliance

This EMP becomes a legally binding document once approved and written confirmation to this effect given through the issuance of an ECC. The provisions and mitigation details given in this EMP must be strictly adhered to and complied with by the proponent.

KBS Management should act immediately when a notice of non-compliance has been received and take corrective action. Complaints received regarding activities on the quarry pertaining to the environment must be recorded in a dedicated registry book and the response noted with the date and action taken. Management must be made aware of any complaints received from stakeholders.

The provisions of the EMP are deemed to have been violated in the following instances:

- There is evidence of contravention of the EMP specifications within and or outside of the quarry area.
- Environmental damage ensues due to negligence.
- Quarry activities taking place outside the defined boundaries of the BPs and HRQ.
- KBS fails to adequately address complaints from stakeholders or IAP's.

3.2.1 Proposed Penalties for Minor Environmental Violations

It is recommended that KBS Management, in its employees' code of conducts, institutes penalties for the following less serious environmental violations and others determined during the course of the work as detailed here below:

- Willful littering on site.
- Persistent or unrepaired fuel and oil leaks.
- Non completion of pre-start checks for machinery & equipment.
- Any person or vehicle or equipment found within an area designated as a 'no-go' area.
- Possession or use of intoxicating substances (drugs or liquor) whilst on duty.
- Possession of a firearm whilst on duty or on the company premises.
- Coming to work under the influence of alcohol.
- Any vehicle being driven in excess of designated speed limits.
- Failure of wearing PPE when working in areas where wearing of PPE is mandatory.
- Failure to wear a seatbelt when driving a vehicle which is fitted with a seatbelt.
- Removal and or damages to fauna, flora or to any cultural heritage objects on site.
- Urination and defecation anywhere other than using designated facilities on site.

3.3 Environmental Awareness Training

It is important that the level of environmental awareness of all personnel as well as suppliers and any third party or contractors who are hired to perform various functions at the quarry be enhanced through an environmental awareness compliance workshop on the EIA and on the provisions of the EMP. The topics presented at such a workshop should include:

- Familiarity with all legislation and guidelines relevant to the quarrying operation.
- The provisions of the EMP and the importance to comply with suggested measures.
- The importance of complying with the quarrying plan.
- Discussions of the potential environmental impacts of the quarrying activities.
- The benefits of improved personal performance.
- Employees' roles and responsibilities including emergency response preparedness.
- Waste management, handling and disposal.
- Aspects related to Safety and Health standards.

3.4 Communication

KBS is recommended to implement the following communication plans that should be continued throughout the lifespan of its quarrying activities.

3.4.1 Internal Communication

Internal environmental communication should be facilitated through these mechanisms.

3.4.2 Notice boards

A notice board can create positive communication opportunities for employees within a small organisation. This is a place where social activities, work-related events, production targets, etc. can be posted. Emergency numbers for the following entities and or stakeholders can be displayed:

- Local Police Office
- Ambulance Services (Opuwo, Okahao, Outapi, etc.)
- Regional Health Inspector
- Fire Brigade Services (Opuwo, Outapi, etc.)

3.4.3 Documentation

Copies of the EMP are to be kept at the quarry site office and be provided to officials of GRN upon inquiry. All current and prospective employees are expected to be made familiar with the provisions of the EMP as part of their employment contracts.

3.4.4 External Communication

Relationship with external stakeholders can be maintained by keeping a registry at the office where details of any members of the public who choose to visit the operation are recorded including those who are looking for employment opportunities.

Complaints from IAP's can also be recorded in a complainant book, stating the date, nature of the complaint and corrective action taken to address the complaint. It is also important to keep records of the trucks coming to the quarry to collect products.

3.5 Monitoring and Reporting

It is essential to assess the effectiveness of the recommended management strategies through monitoring and keeping of records of specific outcomes and then comparing such outcomes to the benchmarks established in the EIA scoping report. Should corrective action be required, it needs to be documented to reflect not only the corrections that were made, but also preventative measures considered to avoid future recurrence. This should be followed up on, in all future monitoring initiatives to ensure the effectiveness.

In addition to keeping records of monitoring actions and outcomes, the implementation should be internally audited on an annual basis after which the EMP document will be updated or revised (as required) to address the issues and mitigation measures identified during such an audit.

During such annual audit, the appropriateness of the EMP to current activities, monitoring studies and legislation should also be reviewed. This will enhance the relevance of the EMP and verify compliance and progress towards the desired outcomes. A checklist provided in **Table 5** is to be used a guideline and should be completed at least quarterly by the Quarry Manager and copies kept on file.

3.6 Reviews

The quarry management plan should be regularly reviewed in order to assess its effectiveness against the overall objectives of the quarrying operational strategy. The review could be triggered due to the following:

- Changing environmental requirements
- Change in the activities or operations associated with BPs and HRQ
- Deficiencies being identified
- Results from monitoring actions appearing different from anticipated norms
- Change in quarrying technologies or improvements in knowledge

3.7 Environmental Emergencies, Incidents and Accidents

KBS Management should compile and maintain an Environmental Emergency Producers to ensure that there will be an appropriate response to an unexpected incident or accident occurring or incidents that will cause environmental impacts throughout the operational period of the quarry.

While all due care is taken with quarrying, there will still be potential for unforeseen incidents which could detrimentally affect the receiving environment. The effective management of incidents and emergencies is often achieved through a combination of proactive and reactive measures being implemented.

The main purpose for these measures is:

- To ensure that appropriate procedures are in place to allow a timely response to incidents.
- To ensure that if an incident does occur, that such an incident does not present a threat to the quarry employees, to the wide community and to the environment.
- To ensure the safe movement of all personnel who may be involved in an incident or accident.
- To minimise the environmental damage.
- To minimise potential damage to the assets of the company and its corporate reputation.

Proactive measures that could be considered are:

- The implementation and maintenance of appropriate control measures.
- The provision of suitable equipment to facilitate an appropriate response to an incident or emergency.
- Training of personnel in maintaining control measures and in the use of emergency response equipment.

Reactive measures essentially comprise putting into action all relevant response measures at the time of the incident. They also include a post-incident review of the effectiveness of the response measures and revision as required.
Ideally, a generalized response to environmental incidents and emergencies should observe the following order or priority:

- Protection of human life.
- Protection of the environment.
- Protection of the company assets and facilities.

In the event of an environmental incident/emergencies, the basic course of action to be taken should be as follows:

- Stop all work in the affected area (provided it can be done safely).
- Check personnel safety.
- Clear the area and secure.
- Implement all necessary control measures to contain the incident.
- Notify directly impacted external stakeholders, if any.

3.7.1 Good Housekeeping

KBS Management must ensure that ‘good housekeeping’ is practiced during the quarrying operations. This will help to avoid disputes on responsibilities and allow for the smooth running of the quarrying operation as a whole. It should be noted that good housekeeping extends beyond the wise practice of quarrying and extraction methods to include aspects related to care and preservation of the environment within which the quarrying operation is located.

3.7.2 **Proposed Inspections**

In **Table 4** below, a list of inspections, the frequency and responsible party, is provided to be used as a guideline in the implementation of the EMP and for the maintenance of housekeeping rules.

TABLE 4: LIST OF CLEANING AND RELATED INSPECTIONS SCHEDULE

Note: The overall responsibility for ensuring that cleaning and the proposed inspections are carried out is vested with the Quarry Manager who may delegate such functions to junior staff members as deemed appropriate.

Inspections	Frequency	Responsibility
Compliance with the provisions of the EMP	At all times during the quarrying activities	KBS Management
Earthmoving Plants, Tipper Trucks & LDVs: - Pre-start checks - General conditions & cleanliness - No overloading - No spills from loaded trucks	 Daily Daily Daily Daily	Operators
Littering on site: - Access routes - Quarry pit haul road - Workshop/administrative block areas - Stockpiles - Access gate to quarry site - All around the premises	 Weekly Weekly Daily Weekly Weekly Biweekly	Quarry Supervisor
General Conditions - Quarry boundaries - Topsoil stockpiles - Product stockpiles - Internal access routes - Wearing of PPE	 Biweekly Weekly Weekly Weekly Daily	Quarry Supervisor
Dust Control Measures - Topsoil excavation - Drilling & Blasting - Loading & Hauling - Quarry internal routes - Topsoil stockpiles	 Weekly During drilling Daily when loading Daily Weekly	Quarry Supervisor
Erosion Control (Rainwater) - HRQ Pit - BPs slopes - Topsoil stockpiles - Product stockpiles - Internal access routes	Before, during & after rainy period	Quarry Supervisor or as delegated
Any hazardous spills (oil, fuel & lubricants)	When reported	Quarry Manager
Waste Disposal (plastics, bottles, cans, etc.)	Monthly	Quarry Supervisor
Noise nuisance (idling, revving, hooting, etc.)	Daily, when quarrying	Quarry Supervisor
Good housekeeping practices	Daily, when quarrying	Quarry Manager
Effective vegetation cover on mined out areas	Post rehabilitation	Quarry Manager or as delegated
Internal Environmental Reporting	Monthly	Quarry Manager
Overall Operational Environmental Audit	Annually	Quarry Manager

3.7.3 **Proposed Inspection Checklist**

The environmental inspection checklist in **Table 5** is provided as a guideline to help improve and cultivate a culture of safeguarding the environment and should be improved upon by KBS Management.

TABLE 5: ENVIRONMENTAL INSPECTION CHECKLIST

Date of Inspection: _____

Checked by: _____

Item	Yes	No	N/A
Copy of the EMP available and readily accessible			
Name of the Quarry Manager is clearly displayed			
Name of the Supervisor - Borrow Pits			
Name of the Supervisor - Hard Rock Quarry			
Contact number of Regional Health Safety Officer is displayed			
Contact number of the Local Police Charge Office is displayed			
Contact number of nearest Ambulance			
Contact number of the Local Primary Health Clinic is displayed			
Contact number of nearest regional Fire Brigade			
Training Induction on EMP Programme done			
Training presented to employees			
Incident Response Plan Displayed in a prominent position			
Emergency Assemble Point shown			
Positions of Fire extinguishers clearly indicated			
Signs displayed where the wearing of PPE's is mandatory			
Topsoil/overburden stockpiles are vegetated			
Minimal to no dust emissions from the premises			
Worked out areas are progressively being rehabilitated			
No apparent illegal discharges to waterways			
No traffic violations for use of public roads			
Stockpiles are kept away from the public using C35 tar road			
Stockpiles appear adequately maintained and managed			
No unnecessary land disturbance observed			
Appropriate noise control measures are being implemented			
Waste receptacles are in place and adequately maintained			
No oil leaks or spills is observed			
Fuel storage is installed at the Camp Site in accordance with legislation			
Refueling to quarry sites is transported in a suitable licensed bowser			
Hazardous materials are being stored in secure bunded area.			
Spill control measures are in place and easily accessible			
No incidents of timber harvesting has been recorded			
No incidents regarding illegal hunting of wildlife has been recorded/reported			
Housekeeping rules are in place and accessible			

4.0 RECOMMENDED MITIGATION MEASURES

In the following **Tables** below mitigation measures have been proposed to reduce the environmental impacts associated with the quarrying operation as identified during the EIA scoping studies.

TABLE 6: LAND DISTURBANCES

The operation involves two BPs located on both sides of C35 and a HRQ situated about 4 km from the BPs. The HRQ is on land measuring about 35 000 m^2 (3.5 ha). The BP to the east of C35 is about 35 000 m^2 or 3.5 ha and that to the west is about 22 000 m^2 (2.2 ha). The mentioned hectares have been cleared of vegetation and bushes, but the actual quarrying is on land which has a much smaller footprint.

Potential Impacts

- Loss of vegetation
- Loss of habitat
- Land surface disturbances through excavations
- Soil erosion

Environmental Objective

Ensure that minimal land disturbance is occasioned by the operation and that the aesthetic values are maintained.

Environmental Goal

Borrow Pit: Develop a Borrow Pit design process which includes site selection, vegetation clearing, management of overburden, operational activities, closure and rehabilitation protocols.

Hard Rock Quarry: Develop a quarry layout plan which indicates quarry boundaries, onsite infrastructure, access routes, pit layout, management of overburden, closure and rehabilitation protocols.

Recommended Mitigation Measures

Quarrying Footprint:
Limit quarrying activities within the confines of the cleared land for both BPs and HRQ. No additional land may be cleared of vegetation unless the EMP has been amended to reflect clearing of such additional land.

Quarry Internal Routes:
Internal routes should be planned and clearly demarcated. Movements of trucks within the quarry should be restricted to such routes. Off-road driving should be discouraged and drivers found driving off-road should be reprimanded.

Topsoil:
Topsoil (overburden) stripped to expose the rock resource should be stockpiled and preserved for future rehabilitation of the quarry. Vegetation regrowth on the topsoil stockpiles should be allowed and encouraged.

Aesthetic & Erosion:
Areas temporarily disturbed during the construction of any access routes that are not required for quarrying activities should be identified, graded and rehabilitated to improve aesthetics and to avoid the possibility of erosions.

Develop an erosion monitoring procedure whereby mined out areas and other potential erosion sites are visually monitored at the end of the wet season each year to identify erosion gullies.

Responsible Party	Quarry Manager	**Timing**	Prior to starting quarry operations
Performance Indicators	Reports & Photographic evidence	**Monitoring**	Weekly during the rainy season

Table 7: LANDSCAPE AND VISUAL INTRUSION

The surface land involved in the quarrying operation is as mentioned in above. From a visual perspective, the HRQ is only partially visible when driving on C41 from the direction of Opuwo to Omakange. The nearest traditional homestead observed was about 4 km away and to the northwest of the HRQ. Both BPs are partially visible from C35 tar road. There are no homesteads or sensitive receptors observed anywhere near the quarry operation.

Potential Impacts

- Quarrying infrastructure - containers, fuel storage tank, etc. on the HRQ.
- Product stockpiles (location) - BPs.
- Waste pollution (papers & plastics).
- Airborne dust particles.

Environmental Objectives

Borrow Pits:

- Minimise the visual impact of both BPs from the general public using C35 tar road which passes between the pits.
- Stabilise soil to the north of BP east of C35.
- Create an environment that provides habitat for local and migratory fauna (birds and goats were spotted drinking water in the BP)
- Ensure that mature trees are protected and not uprooted during the excavation of overburden.
- Where applicable, ensure that landscape screening and rehabilitation is established and maintained.

Hard Rock Quarry:

- Minimise the visual impact of the HRQ from surrounding viewpoints.
- Create a safe and functional landscape around the HRQ.
- Reinforce the local landscape character by ensuring that existing vegetation is maintained where possible.
- Ensure that any drainage issues are adequately addressed.

Environmental Goal

Ensure that measures are implemented to mitigate and limit the visual impacts of the quarrying operation.

Recommended Mitigation Measures

Permanent Structures:
Reduce visual impacts on any permanent structures that may be constructed in future by painting roofs and walls of such structures with paint of matt finish so as to reduce reflection. Locate infrastructures away from sensitive and elevated area.

Stockpiles:
Topsoil stockpiles for materials to be used in future for quarry rehabilitation, should preferably be kept at the low heights and preferably vegetated to reduce the risk of soil erosion and to decrease visual disturbance. Keep heights of product stockpiles as low as possible to reduce visual impact.

Dust Suppression:
Ensure effective suppression of dust including spraying with water or covering dust prone areas with crushed stones to avoid dust escaping into the atmosphere becoming a visual nuisance to the general public using the C35 tar road.

Light Pollution:
Ensure that any security light used at the quarry site or at the Camp Site does not offend residents of the settlement. The lighting layout should direct lights inwards to the Camp Site and not outwards to the settlement or to C35.

Waste:
Wind-blown papers and plastics around the quarry boundary fence should be regularly picked up to avoid visual nuisance.

Housekeeping:
Maintain a high standard of housekeeping around the quarry areas and Camp Site by keeping the place litter-free, clean and tidy.

Responsible Party	Quarry Manager	**Timing**	Ongoing throughout the quarry operation.
Performance Indicators	Site inspection	**Monitoring**	Ongoing

TABLE 8: SURFACE WATER, DRAINAGE AND UNDERGROUND WATER

The project area receives minimal rainfall of about 250 mm per annum and there were no sources of surface water observed in the surroundings.

Potential Impacts

- Contamination of underground water resources from oil leaks and or oil spills.
- Contamination from chemicals used for blasting - but the quantities involved is much small.

Environmental Objective

- Water should be used sparingly because it is a scare resource especially in the Kunene region where the project is located.
- Ensure that water discharged from the HRQ does not adversely impact on the beneficial uses of downstream users and receiving waters.
- Ensure that underground water sources are protected and that the operation does not impact negatively on such sources.

Environmental Goal

Ensure that the quarrying operation does not impact negatively on the available water resource.

Recommended Mitigation Measures

Surface Water Management:
All surface water management controls such as diversion/catchment drains, sediment basins, etc. are to be regularly inspected and cleaned of accumulated sediment. Inspection should be carried out before the onset of the rainy season, during the rainy period and immediately after the rainy period.

Rainwater Collected in HRQ:
In the event that rainwater accumulates in the quarry pit and has to be pumped out, it is recommended to conduct tests on such water to determine whether such water complies with the relevant groundwater indicators, before pumping such water out, into any natural water streams around the quarry area.

Contaminated water
Any water from equipment and truck wash bays and workshop must be directed to oil/water separators and must not be discharged into the natural water streams. Sediments stained with grease and oil must be periodically removed and managed in accordance with good practice. The simplest way to treat silt-laden water is by can by filtering through a drum containing sand and crushed stones.

Erosion Areas:
Within the BPs and HRQ premises, areas that are likely to suffer from soil erosion should be identified, regularly inspected and suitably measures taken to ensure erosion is minimised, if not eliminated.

Construction of a Sump:
One way to control water in the quarry is pit, is to construct and to maintain a suitable sized sump in the active extraction area specifically designed to catch all rainfall that enters the extraction area. Water collected in the quarry pit can also be pumped into such a sump where it stored and used for cleaning and dust arraying purposes.

Fuel Storage and Handling
No fuel should be stored on the BPs and HRQ premises. Fuel should only be stored at a designed area inside the Camp Site. The designated storage area is to be bunded and regularly inspected and clearly signaged. All mobile equipment working in the quarries are to be refueled from a suitable mobile diesel bowser. Such fuel bowser should be licensed, roadworthy and fitted with a fire extinguisher.

Management of Oil Spills and Leaks
Any oil spills or leaks encountered during the operation should be immediately contained and the contaminated soil scooped out and disposed of in accordance with good practice. Covering oil spilled areas with sand is strictly forbidden.

Responsible Party	Quarry Manager	**Timing**	Before the onset of the rainy period.
Performance Indicators	Reports, site inspection, etc.	**Monitoring**	Ongoing throughout the rainy season.

Table 9: NOISE MANAGEMENT

The two BPs are about 7 km from Omakange settlement while the HRQ is about 6 km away. It is also important to highlight that there are no sensitive receptors (urban location, lodges, homesteads, etc.) in the area. The nearest traditional homestead to the HRQ is about 4 km away. The C35 tar road which is used by about 500 motorists per day runs between the two BPs.

The Camp Site is located at the settlement.

Potential Impacts

- Hearing disturbances
- Health hazard
- Amenity nuisance

Environmental Objective

Enhance and protect amenity values by ensuring that noise levels from the quarry operation is minimized.

Environmental Goal

Protect amenity values by ensuring that noise levels at the quarry are minimised.

Recommended Mitigation Measures

Working Hours:
Limit working hours to day light as follows:

- Monday to Friday: 07h00 to 17h00
- Saturdays : 07h00 to 13h00
- Sunday, national public holidays : no work

Personal Protective Equipment:
People working in areas where noise levels are high should be provided with suitable PPE. Wearing of such devices should be enforced.

Machine Fleet Used in Operation

- Ensure that all equipment used in the operation has appropriate mufflers/controls and such equipment is properly maintained and regularly serviced.

- Where practicable use of broadband reversing beepers or similar devices should be installed on earthmoving trucks.

Further Noise Abatement Mechanisms:
Apart from confining noise to normal work hours as detailed above, the following noise abatement (reduction of intensity and amount) measures should be implemented:

- Equipment should be operated at the minimal power ratings to undertake the required task.
- Machineries must be switched off when not in use.
- Unnecessary hooting, idling & revving should be avoided.
- All machine operators must be well trained and well acquainted with the provisions of this EMP.
- Operators of machineries and equipment must be provided with PPE and wearing of such PPE's enforced.
- No noise amplifications equipment must be allowed at the Camp Site.

Complaints:
Any complaints related to noise disturbances received from stakeholders/community should recorded, investigated immediately and corrective action taken.

Responsible Party	Quarry Manager	**Timing**	Ongoing throughout the operation lifespan
Performance Indicators	Number of complaints, etc.	**Monitoring**	Ongoing throughout

TABLE 10: BLASTING AND ASSOCIATED VIBRATIONS

Drilling and blasting is conducted in the HRQ only, but not in the BPs where gravel is generated by means of excavation with bulldozers and excavators. Drilling and blasting is contracted to a third party who meets the requirements as stipulated in the Explosive Act.

Potential Impacts

- Injury
- Death
- Loss of limps
- Noise impacts
- Vibrations
- Shock wave

Environmental Objective

Ensure that blasting is conducted in full compliance of applicable regulations and performed by a licensed blaster.

Environmental Goal

Ensure that blasting operations are conducted in a manner which minimises the risk of adverse environmental impact.

Recommended Mitigation Measures

Legal Requirements:
The following are some of the requirements/guidelines to conduct commercial blasting:

- It is a criminal offence to handle, transport, store and use explosives without authorisation/certification.
- By law, blasting is exclusively performed by a person in possession of a valid open surface blasting certificate.
- Explosives are to be transported in a fit-for purpose vehicle approved and licensed for such purpose.
- Blasting must be conducted in a manner which prevents injury to persons and wildlife as well as damage to properties.
- No blasting may be conducted under adverse weather conditions such as high winds or when it is raining.
- Explosives must be stored in an approved tamper-proof explosive storage magazine, constructed as prescribed in applicable regulations

Blasting Days & Time

- Blasting must be conducted between Monday and Friday between 09h00 and 16h00.
- No blasting should be conducted on Saturday, Sundays and Public holidays.

Blasting Notices:
Adequate notices of at least 48 hours should be given to these parties/agents:

- Namibia Airports Company for air traffic in the area
- Namibia Police – local police
- Roads Authority
- Neighbouring residents.
- No entry signs must be placed at the access road to the HRQ.

Records:

- Proper records of blasting should be kept by the Quarry Manager at all times.

Air and Ground Vibrations
Ensure that blast scale is designed in such a way that air and ground vibrations resulting from such blasts are within acceptable parameters.

Post Blasting Activities:

- The area blasted must be inspected by a qualified blaster.
- Any misfired holes must be treated and made safe before quarrying activities are resumed.
- All explosive remnants and detonators must be collected from the blasted site and disposed of in a prescribed manner.

Responsible Party	Quarry Manager	**Timing**	Before any blasting
Performance Indicators	Blasting records	**Monitoring**	With each blasting performed

TABLE 11: DUST IMPACTS ON AIR QUALITY

Primary sources of dust generation in a quarrying operation are movements of machinery fleet, crushing and screening activities, blasting and stockpiles.

Potential Impacts

- Eye irritation
- Health hazard
- Amenity nuisance
- Airborne dust particles
- Noxious emissions
- Wind-blown dust.

Environmental Objective

Prevent dust generated by the operation such that the impact on the ambient air quality is minimized and social amenity and health values are maintained.

Environmental Goal

Ensure that dust levels are managed and do not impact on the health and amenity of personnel and the general public in the surrounding area.

Recommended Mitigation Measures

Material Stockpiles:
Where possible material stockpiles should be located in sheltered areas where they are not exposed to the erosive effects of the wind. Where erosion of stockpiles becomes a problem, erosion control measures must be implemented. This could be achieved by:

- Limiting drop heights from the discharging conveyor belt.
- Reducing the height and slope of the stockpiles
- Positioning the stockpiles in areas where they are not exposed to wind erosion.

Conveyors:
Dust emissions from the conveyors can be minimised in the following ways:

- Partially enclosing conveyors
- Minimising product drop heights
- Appropriate design of hopper load systems to ensure a fit with trucks.

Supervision:
Supervisors at the BPs and HRQ sites should be instructed to immediately report situations resulting in elevated dust emissions to the Quarry Manager for proper measures to be taken. Spillages from conveyor belts and crushing sections should be regularly cleaned up.

Paved Surfaces:
The access road to the HRQ and the entire Camp Site area including the weighbridge have been covered with crushed stones to combat dust generation. This should be maintained and kept tide and clean. Access to the BPs is from C35 tar road and very short requiring no gravel.

Trucks/Vehicles:

- Manage volumes loaded into trucks in order to avoid spillages.
- Subject to the types of tippers being used, it may be essential that product trucks are covered and enclosed with suitable tarpaulins.
- Speed limits are to be defined within the quarry premises and drivers have to comply with such speed limits.

Personal Protective Equipment (PPE):
People working in areas of the quarry where dust is generated should be provided with suitable PPE. Wearing of such PPEs should be enforced at all times.

Complaints:
Any complaints or claims emanating from lack of dust control should immediately be investigated and corrective action taken.

Responsible Party	Quarry Manager	**Timing**	Ongoing throughout
Performance Indicators	Reports	**Monitoring**	Ongoing throughout

TABLE 12: WASTE HANDLING AND MANAGEMENT

The operation is expected to generate all types of waste: household waste, industrial waste or hazardous waste and limited chemical waste (from blasting activities).

Potential Impacts

Impacts associated with waste are:
- Visual nuisance
- Odour nuisance
- Health hazard
- Amenity nuisance

Environmental Objective

Minimise waste quantities, protect amenity values by ensuring a hygienic and waste-free quarrying operation.

Environmental Goal

Protect amenity values by ensuring that waste is collected and disposed of at designated sites.

Recommended Mitigation Measures

Waste Management Plan:
A Waste Management Plan (WMP) should be developed for the quarrying operation. The WPM should include details of waste types, procedures to be followed and facilities where wastes are to be disposed of.

Hazardous Waste:
All earthmoving vehicles and tipper trucks should be inspected daily for oil leakages. Maintenance and washing of earthmoving and all LDVs should take place only at a designated workshop area which is lined with concrete and supplied with an oil-water separator for collection of run-off from washing. Oil filters should be stored in a marked container that allows oil to drain through but not escape from the storage.

Trained Personnel:
Hazardous waste should be handled by trained personnel. Spill management kits, PPEs and relevant emergency procedures should be available at the workshop and quarry area. Any spills should immediately be contained and cleaned up and the contaminated soil appropriately disposed of.

General Waste:
Keep the quarry premises clean and tidy at all times. All domestic and workshop wastes should be cleaned and contained daily. Small quantities of papers and plastics may be burned at a designated site within the quarry premises.

Waste Bins:
Separate containers or bins should be provided for household and general workshop wastes which should be emptied regularly and removed from site to a recognized waste disposal site (Okahao and Opuwo are the nearest sites). Waste bins should be clearly marked and all employees trained and sensitized on how to dispose of waste in a responsible manner and to avoid littering.

Site Sewage:
The septic sewage system at the Camp Site should be regularly pumped and waste appropriately disposed of. The ablution facilities should also kept clean and tidy at all times.

Waste Survey
- It is advisable to conduct a waste survey to establish the types, quantities involved and recycling/re-use percentage for all site wastes.
- Use the outcome of the survey to set quantifiable and achievable waste reduction targets for the operation for each waste class.

Responsible Party	Quarry Manager	**Timing**	Ongoing throughout
Performance Indicators	Reports	**Monitoring**	Ongoing throughout

TABLE 13: TRAFFIC IMPACTS ON PUBLIC ROADS

The national roads in the project area are: C35 from Kamanjab to Ruacana via Omakange and C41 from Oshakati to Opuwo via Okahao and Omakange. These roads have been upgraded to bitumen standards in the last fifteen years and are therefore in good conditions and have to maintained and kept care of.

Potential Impacts

- Overloading will lead to road damage reducing the lifespan of national roads.
- Over speeding will lead to incidents and ultimately accidents.
- Use of unlicensed and non-road worthy vehicles could lead to unnecessary accidents.
- Spillage could lead to safety hazard, nuisance and annoyance to other road users

Environmental Objective

Ensure road regulations are upheld and maintained at all times in order to avoid injury or death to pedestrians, road users and wildlife associated with access to and from the quarry.

Environmental Goal

Enhance and protect amenity values by ensuring that traffic regulations are upheld and maintained.

Recommended Mitigation Measures

Spillage
Ensure that all access roads leading from C35 into the BPs are clear of material spillages which may otherwise present safety hazard to road users.

Signage
Liaise with the RA and install suitable hinged truck road signs along the section of C35 adjacent the BPs to warn the northbound and southbound traffic of trucks entering and leaving the BPs. This has been done at the intersection of the access road to HRQ and C35.

Weighing:
Trucks loaded with aggregates should pass over the weighbridge to have their payloads weighted and recorded. Overloading will cause undue wear and tear on national public roads reducing their economic lifespan.

Road Regulations:
All company tipper trucks and LDVs used on public roads must be licensed, roadworthy, supplied with Mass Distance Logbooks and operated by licensed drivers with valid public driver's permits. No over speeding on public roads and drivers found over speeding should be reprimanded. All road signs should be respected and complied with.

Canvas Covers:
Tipper trucks transporting sand materials on public roads should be covered with suitable canvas covers to ensure that that dust being blown off from the tipper truck does not become a nuisance to other road users. Canvas covers will also prevent possible spillage on public roads which can be a safety hazard to other road users.

Training:
All truck operators should be given a training workshop on the EMP. To ensure that satisfactory comprehension is achieved, it is advisable for the training to be presented in a language best understood by the operators. It is further recommended that truck operators undergo a defensive driving training to enhance their driving skills, safety awareness and their responsibilities towards other road users especially when driving on public roads.

Complaints:
Any complaint(s) received from any stakeholder with respect to traffic violations should be recorded, promptly investigated and corrective action taken.

Responsible Party	Quarry Manager	**Timing**	Ongoing throughout
Performance Indicators	Reports, site visit	**Monitoring**	Ongoing throughout

TABLE 14: FUEL STORAGE, HANDLING AND REFUELING

Fuel for the quarry operation may be procured in bulk and stored at the site in full compliance of the Petroleum Product and Energy Act (Act 13 of 1990).

Potential Impacts

- Fuel Leakage (groundwater contamination)
- Fuel spills
- Fire hazard
- Safety hazard

Environmental Objective

Ensure that a high standard of safety is maintained for fuel storage and handling thereof.

Environmental Goal

Protect amenity values, operational and business efficiency by ensuring that any adverse impacts from fuel storage and handling thereof are minimized.

Recommended Mitigation Measures

Designated Storage Area:
One fuel storage area should be designated at the Camp Site and no fuel is allowed to be stored at the BPs and the HRQ. The Transnamib fuel storage tank should be disposed of and removed from the HRQ. Any storage devise installed must be situated on a smooth impermeable surface (plastic or concrete) base with an earth bund. The floor of the bund must be sloped towards an oil trap or sump to enable any spilled fuel and or fuel-soaked water to be removed, or the bunded area must be covered.

Fuel Security:
The fuel storage facility must be fitted with lids which are kept firmly shut at all times with keys kept in the onsite office. Smoking and naked flames must not be allowed in the vicinity of the fuel storage area.

Signage:
Symbolic signage clearly depicting “No Smoking” “Danger” & “No Naked Lights” must be clearly displayed and must conform to local standards. The volume capacity of the fuel tank must also be displayed.

Fire Safety:
The areas of fuel storage and any other flammable materials must comply with fire safety regulations.
Any fuel dispensing pump (electrical or fuel-driven) must be equipped and positioned so as not to cause danger of ignition of the product. Suitable and adequate firefighting equipment should be provided at the site.

Fueling:
Earthmoving and equipment fueling should be undertaken on a hard impermeable surface or over drip pans to ensure spilled fuel is captured and cleaned up. Defective hoses, valves and containment structures should be promptly repaired. Refueling of earthmoving machines working in the quarry pit should be done from a suitable mobile diesel bowser.

Training:
The personnel handling fuel should be properly trained and well acquainted with fuel regulations and the provisions of the EMP.

Responsible Party	Quarry Manager	**Timing**	Prior to commencing with the operation
Performance Indicators	Documents, Site Inspection	**Monitoring**	Ongoing throughout

TABLE 15: HEALTH AND SAFETY IMPACTS

Amongst the laws and regulations applicable to this aspect are: 'Labour Act of 1992 – Regulations Relating to the Health and Safety of Employees at Work' and the more recent 'Public Health Covid-19 General Regulations' as Amended.

Potential Impacts

- Incidents & accidents
- Injuries
- Loss of life
- Loss of assets/properties
- Unhygienic conditions

Environmental Objective

Conduct quarrying operations by maintaining a high standard of health and safety.

Environmental Goal

Protect amenity values and business efficiency by ensuring that a high standard of health and safety is maintained in all quarrying activities.

Recommended Mitigation Measures

Health & Safety Plan:
Develop a Health and Safety Plan which makes provision for raising of awareness, sharing of information as well as access to health care services. The health and safety of workers should be protected and safeguarded at all times.

The Covid-19 Pandemic
Respect and to implement the measures announced by MHSS with respect to Covid-19 regulations. Some of the measures to contain the spread are:
- Wearing of masks.
- Avoiding large gathering such as weddings, funerals, bars, etc.
- Social distancing.
- Getting vaccinated.

Emergency Response:
Develop an Emergency Response and Procedures Plan for the quarrying operation to deal with any safety incidents or accidents occurring such as:
- Accidentally spill of hazardous materials.
- Accident involving personnel on the work sites.
- Fire or major landslide or structural failure, etc.

The following should be included in such plan as basic principles:
- Preventive and responsive actions;
- Responsible person to coordinate such actions;
- Reporting procedures for incidents and accidents on site, and
- Corrective measures to be taken to avoid a repeat.

Personal Protective Equipment (PPE):
Provide and supply suitable PPE's to all employees working on the quarry and enforce wearing of such PPE's.

Encourage Good Housekeeping Practices at the workplace and Camp Site:
- Workplace must be clean and litter-free.
- Ensure proper handling of all waste products.
- No drinking of alcohol should be allowed at the workplace and Camp Site.
- No carrying of fire arms at workplace and Camp Sites.
- No use of drugs.
- No excessive noise.

Responsible Party	Quarry Manager	**Timing**	Prior to commencing with the operation
Performance Indicators	Documentation	**Monitoring**	Ongoing throughout

TABLE 16: ASPECTS RELATED TO BIODIVERSITY

Quarrying activities will lead to biodiversity vulnerability resulting from tampering with the land and soil structure leaving pits and exposing the site to possible landslide and soil erosion, hence destruction of various fauna and flora. However, there are no plants, trees or wildlife that are endemic to the area of Omakange where the quarry is located.

Potential Impacts

- Loss of habitat
- Loss of grazing
- Displacement of flora
- Displacement of fauna
- Possibility for soil erosion
- Tree cutting
- Fire risk

Environmental Objective

Maintain and upheld the integrity of the biodiversity throughout the quarrying lifespan

Environmental Goal

Ensure the quarry operation quarry does not impact negatively on the existing ecosystem.

Recommended Mitigation Measures

Biodiversity Monitoring Plan
It is proposed that a rehabilitation and biodiversity monitoring plan is developed by management which will ensure that the site is restored to its near natural productive state. The plan will also inform continual improvement of the ecological state after rehabilitation.

Training:
An environmental induction specifically dealing with aspects related to the biodiversity (flora and fauna) and the importance thereof should be offered to all employees of KBS working at the quarry.

Vegetation:
Vegetation should be allowed to grow on quarry slopes and where considered appropriate, storm water management should be put in place to limit the potential of soil erosion. Big trees and any trees in which birds are nestling should be avoided and left undisturbed when stripping the topsoil to expose the rock underneath.

Quarry Internal Routes:
Earthmoving machinery should be operated on dedicated quarry internal routes only. Such routes should be well planned and well maintained. Off-road driving should be discouraged and drivers found driving off-road should be reprimanded.

Fire Wood:
Illegal harvesting of trees for fire wood or for any other purposes is prohibited. Open fire is allowed at designated places only.

Hunting
Illegal hunting of wildlife and or killing and or theft of livestock grazing around the quarry premises are criminal offences punishable by law and are not allowed. The same applies to reptiles and small insects.

Responsible Party	Quarry Manager	**Timing**	Prior to commencing with quarrying operation
Performance Indicators	Documentation	**Monitoring**	Ongoing throughout

TABLE 17: ARCHAEOLOGICAL AND CULTURAL HERITAGE

There are no known sites of cultural or archaeological interest in the vicinity of the quarrying operation. In the event that any such sites or items of cultural heritage are unearthed during the quarrying activities, the following procedure should be followed:

Potential Impacts

- Possible unmarked graves
- Damage to an archaeological items
- Undetonated landmines/explosives
- Fossil shells
- Stone artifacts
- Fossil bones

Environmental Objective

Ensure due consideration is given to matters of cultural heritage and the general wellbeing of the affected community and matters incidental thereto.

Environmental Goal

Safeguard and protect any findings of an archaeological or cultural heritage nature until such time that NHC confirms such findings and directs on the way forward.

Recommended Mitigation Measures

Heritage & Archaeological Sites:
Should a cultural heritage site or an archaeological site of interest be uncovered or discovered during the quarrying operations, i.e. a “chance find” the following procedure should be applied:

- If operating a machine or equipment, stop work immediately.
- Inform supervisor and secure the site by demarcate it with plastic warning tape.
- Cease any works in the immediate vicinity.
- Determine GPS position if it is possible.
- Supervisor must report findings, site location and actions taken to the Quarry Manager.
- The Quarry Manager must immediately contact the office of NHC in Windhoek giving details with respect to the nature of the findings, site location, GPS Coordinates, etc.
- Inspect site and confirm addition to quarry’s geographical information system;
- NHC will advise on the way forward otherwise request written permission to remove findings from work area.
- Recover, pack and label findings for transfer to the National Museum as guided by NHC.

Human Remains:
Should human remains be found, the following actions will be required:

- Apply the chance find procedure as described above.
- Schedule a field inspection with an archaeologist to confirm that remains are human.
- Advise and liaise with the NHC and NamPol.
- Remains will be recovered and removed by the police either to the National Museum or the National Forensic Laboratory.

Responsible Party	Quarry Manager	**Timing**	Ongoing
Performance Indicators	Documentation	**Monitoring**	Ongoing

TABLE 18: SOCIAL AND COMMUNITY IMPACTS

The quarrying operation is located in one of the impoverished locations in the country and should therefore provide vital economic opportunities amongst the locals including stimulating downstream value added facilities, i.e. manufacturing of cement based products (bricks, precast panels, paving, road kerbs, etc.) for which there is huge demand.

Potential Impacts

- Supply of good quality construction and road building materials.
- Increased local economic activities in the surrounding towns of Opuwo & Okahao.
- Injection of income into the Omakange local community
- Creation of employment
- Increased regional trading opportunities
- Community support

Environmental Objective

Optimize benefits to the local economy

Environmental Goal

Provide opportunities for local business, promote industrial relations, and contribute to socio-economic stability of the settlement.

Recommended Mitigation Measures

Goods & Services:
Continue sourcing and procuring goods and services for the quarrying plant from local suppliers where applicable. Contribution to the regional and national economy should be monitored and reported on through annual reviews where applicable.

Workers:
When a vacancy does exist, efforts should be made to fill such vacancies by hiring and recruiting from the locals. This should specifically apply for manual and unskilled vacancies with preference given to residents of Omakange who live within the walking distance of the quarry.

Corporate Social Responsibility:
Contributions made by the quarrying company to the community should be reported on in the media so as to enhance the profile of the company to the general public. Membership of the Chamber of Mines or the Namibia Chamber of Commerce and Industry (NCCI) is recommended.

Logbook/Complaint Book:
A logbook or complain book should be kept at the gate of the quarry where all vehicles visiting the operation are recorded, the time of entry, exit, the type of vehicle, and its destination. This will give an indication of the number of vehicles visiting the quarry.

Complains related to any activities of the operations by the stakeholders should also be recorded in the same book. The date, time and nature of the complaint should be recorded as well as the contact details of the complaint or stakeholder.

People looking for employment should also be recorded and those with the necessary skills and experience offered the opportunity to compete for vacancies that might arise in the future at the quarry.

Responsible Party	Quarry Manager	**Timing**	Ongoing
Performance Indicators	Documentation	**Monitoring**	Ongoing

5.0 CONCEPTUAL CLOSURE PLAN

The purpose of this Section in the EMP is to provide for a conceptual closure plan, including restoration objectives but excluding financial provisioning because the resource is huge and has a lifespan that goes many years into the future. The structure of this plan is in accordance with the Namibian Mine Closure Framework (The Chamber of Mines of Namibia, 2010).

5.1 Objectives

The objectives for the quarry closure and the rehabilitation of disturbed areas are:

- To ensure that the site is safe for both humans and animals.
- That the residual impacts are managed to acceptable levels and will not deteriorate over time.
- That closure is achieved with minimal socio-economic upheaval in the event of such closure occurring prematurely, i.e. due to economic factors.
- That the biodiversity and environment on the site are safeguarded and protected.
- To provide sufficient funds at the end of the life of the quarry, to properly implement the closure plan.
- To ensure that land is made stable, both in terms of geotechnical parameters and erosion so that post quarry land use is not compromised by site instability

5.2 Closure Planning

The planning for closure and rehabilitation should be an on-going process, which is adapted and updated during the Operational Phase of the quarry, refining the closure criteria and associated costing to develop a preliminary closure and restoration plan. This plan should reflect changes in the quarry development, operational planning, environmental and social conditions.

KBS will be required to undertake a detailed closure and rehabilitation process during the Operational Phase. At this stage it is not possible to provide explicit details as to how this process will take place, because technology, science and legislative requirements may well have changed by the time the quarry begins its decommissioning process. Based on preliminary observations and the planned extraction rates, the resource is quite huge and will be exploited for many years into the future.

However, a thorough closure development strategy has to be formulated now which should be reviewed and improved throughout the remaining lifecycle of the quarrying operation. Ideally, the final closure strategy should include and provide for a continuous rehabilitation and final closure.

The closure plan should make provision for two closure scenarios namely:

- Closure at the completion, i.e. depletion of rock resources from the HRQ and gravel from the BPs.
- Immediate closure, i.e. a sudden closure of operations due to economic factors such as recession.

Although planning for the latter cannot be done in much detail, being prepared for such unforeseen circumstances relies on having an updated detailed closure plan, which gives the operator the ability and flexibility to rapidly evaluate the remaining unknowns and risks associated with closure and to develop an appropriate decommissioning plan.

5.3 Socio-Economic Considerations

It is important to identify and engage key stakeholders in the formulation of a successful Mine Closure Plan since a quarry closure such as this one envisaged by KBS at Omakange settlement is likely to result in substantial changes in the community and the environment in which it operates (The Chamber of Mines of Namibia, 2010).

Engagement will enable stakeholders to have their interests considered as part of the closure planning process, whilst creating an understanding for their views and expectations and formulating a balanced, realistic and achievable closure outcome.

Stakeholder engagement is an ongoing process that should start in the planning phase, and continue throughout the operation and quarry closure phases. It should include consultations and providing feedback to all affected parties and stakeholders.

The parties that should be consulted are divided into those that are directly affected:

- employees of the quarry
- any contractors and sub-contractors
- the traditional authority
- Kunene regional authorities (Omakange settlement)
- service providers (fuel companies, suppliers of spare parts, etc.)
- GRN institutions (Ministry of Labour, MEFT, etc.)
- product end-users (building contractors, brickyards supported by KBS, etc.)

5.4 Mechanism to Manage Socio-economic Effects

Various mechanisms are available to manage post closure social issues such as these ones that are highlighted here for academic purposes only:

- establishment of a Future Forum;
- mechanisms to Save Jobs and avoid Job Losses and a Decline in Employment;
- mechanisms to provide alternative solutions to retain jobs where job losses cannot be avoided; and
- mechanisms to improve the social and economic impact on individuals, regions and economies when retrenchment or closure of the quarry is certain.

At this stage, no financial provision is made for the above mentioned mechanisms and KBS will need to ensure that sufficient provision is made for the management of these issues.

5.5 Financial Provisions for Closure

The financial provision for socio-economic effects should be structured to include:

5.5.1 Employee Costs:

Provisions should be made for the following:

- for retrenchment (i.e. severance, leave days, or retention packages)
- new employment opportunities
- retraining costs

5.5.2 Social Aspects

Social aspect deals with the sustainability of affected communities:

- Exit strategy, i.e. process by which the quarry will cease to support local initiatives.
- Social transition, i.e. support that will be provided to the community to transition to new economic activities.

5.5.3 Physical Rehabilitation

The quarry infrastructure components that will be decommissioned and rehabilitation are:

- the Hard Rock Quarry, i.e. the excavated open pit;
- the excavated Borrow Pits;
- all quarry internal routes;
- any fixed structures, i.e. workshops, ancillary support facilities, etc. weighbridge, etc.
- water supply line;
- electrical connections (transformer, distribution boxes, etc)
- weighbridge, security office, etc. and
- any fencing around the premises, etc.

5.6 Decommissioning Strategy

The following methods and management strategies are proposed for the decommissioning and rehabilitation during final closure.

TABLE 19: DECOMMISSIONING STRATEGIES

General:

- All rubbish and wastes should be removed from sites (the two BPs, HRQ and Camp Site) and disposed of at designated waste dump sites.
- Decommissioned quarrying areas should be stabilized to prevent incidents of slope failure and erosion post quarrying activities.
- Prior to decommissioning unused fuel, all scraps, etc. are to be removed from site.

Quarrying:

- During the closure process it is advisable for the quarry to remain secured with access allowed only via a locked gate. Clear warning signs should be displayed at all possible places around the quarry. Fencing will prevent access by animals and humans.
- The Quarry should be secured against inflow of surface runoff water and discharge.
- Potential partial backfilling of the quarry pit and BPs should be explored using stockpiled overburden. The surface should be covered with topsoil to allow vegetation to grow. Any protective berms diverting surface flow should remain in order to avoid any erosion of the soil cover.
- The possibility to use the HRQ as a future waste landfill for the Omakange Settlement should also be explored with settlement management and or regional council leadership.
- It is also possible to use the quarry as an aquaculture fish pond by filling it up with fresh water and to rear fresh water fish species such as Tillapia. Technical know-how on aquaculture can be obtained from the Ministry of Fisheries & Marine Resources.
- If the Quarry is backfilled fully or partially the infill should be contoured to blend in with the surrounds. Backfilling may not be undertaken if:
  - it makes the operation unviable.
  - it sterilizes a potentially viable rock resource in the future.
  - there is a possibility that the safety of future quarrying operations will be jeopardized.

Quarry Operation Infrastructures:

- Dismantle and remove all electrical cabling for resale.
- Remove all scrap metal from the quarry for recycling or sale.
- Rip surface to alleviate compaction and encourage re-growth of local vegetation.
- Dismantle any fixed structures and accessories.
- Dismantle the workshop and all associated equipment & steel materials for recycling, sale to third parties or disposed of as scrap materials.
- All disturbed footprint areas should be graded and re-countered to match the surrounding landscape.
- The surface should be ripped and covered with topsoil to ensure water infiltration and re-vegetation.

Quarry Access and Internal Routes:

- In the short term the access road should be kept open to allow access for closure monitoring.
- If the HRQ pit will be used as future waste landfill or as an aquaculture pond for rearing fresh water fish, the access road has to remain to allow access to the site.
- Contour any road corridors to restore natural drainage.
- Deep rip surface to alleviate compaction and encourage re-growth of local vegetation.
- Access to the rehabilitated area should be restricted.

Water Connections:

- Water and any drainage systems to be shut off and any surface water pipes removed from the site.
- All scrap water pipes should be recovered for recycling.
- Contour the area to restore natural drainage.
- Rip the surface to alleviate compaction and encourage re-growth of local vegetation.

Sewage System:

- Dismantle and remove any sewage treatment facilities from the site.
- Recycle any scrap metal.
- Contour the area to restore natural drainage.
- Rip the surface to alleviate compaction and encourage re-growth of local vegetation.

TABLE 19: DECOMMISSIONING STRATEGIES			
Any Remaining Materials: All other remaining materials, which are anticipated to be small quantities of non-recyclable items and rubbish, should be disposed of at designated waste dumps.			
Responsible Party	Quarry Manager	**Timing**	Reviewing the decommissioning plan must be ongoing
Performance Indicators	Documentation	**Monitoring**	Annual

5.7 Post Closure Monitoring

Post-Closure monitoring and management is also accounted for and it is recommended that this should involve the following:

- vegetation succession monitoring and management
- erosion monitoring and management
- surface run-off monitoring
- monitoring and management pollution control

Post closure monitoring should continue for a minimum period of at least five years depending on anticipated risks.

5.8 Financial Provisions for Rehabilitation

The Minerals Policy of Namibia (1999) endorses the 'polluter pays' principle which places responsibility for pollution mitigation on the party that caused the pollution. This principle is strengthened by the Mine Closure Framework (The Chamber of Mines of Namibia, 2010) and IFC (IFC, 2007). It aims to ensure that environmental liabilities do not remain with the government, but that mechanisms are put in place by mining companies to make sure that adequate financial resources have accrued at the time of closure to cover these costs at a time when revenue is no longer being generated.

KBS Management should review the closure provision on an annual basis to ensure that provisions are correct and up to date. The costs associated with the decommissioning strategies and the monitoring and management program cannot be quantified at this stage.

5.9 Conclusion on the Closure Plan

This Closure Plan cannot anticipate all of the issues that will arise during the projected life of the quarrying operation and therefore, it is not intended to be a definitive closure prescription. This document does, however, provide an outline of the closure process that may be undertaken. A detailed closure plan will be prepared closer to the actual closure date, when the date of closure has been confirmed.

6.0 CONCLUSION

Although all possible actions and potential mitigation or management actions are contained in this document, the EMP should be considered as a day-to-day management tool. The EMP therefore sets out the minimum environmental and social standards that are required to minimise the negative impacts and maximize the positive benefits of the quarrying operation anticipated to be revived by KBS at Omakange.

The EMP should be reviewed on an on-going basis and any changes or amendments made communicated to MEFT. Based on the observations made during the site inspections, KBS Management should be able to assess whether any modifications to the procedures as proposed in this EMP may be required to improve the overall efficiency and applicability of the EMP to its quarrying operation.

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