



EXPLORATION FOR MARBLE

FINAL: ENVIRONMENTAL MANAGEMENT PLAN (EMP)



***FOR THE PROPOSED EXPLORATION STUDY
FOR MARBLE AT CLAIM No: 69059 – 69060
ERONGO REGION, KARIBIB DISTRICT, NAMIBIA***

PROJECT DETAILS

TITLE: FINAL ENVIRONMENTAL MANAGEMENT PLAN FOR THE PROPOSED EXPLORATION STUDY FOR MARBLE AT CLAIM No: 69059 – 69060 ERONGO REGION, KARIBIB DISTRICT, NAMIBIA

PROPONENT:

Mr. Melvin Pienaar
POBOX 2
Usakos, Namibia

CONSULTANCY:

HJGeo-Enviro Consulting and Trading Cc
P.O.Box: 8574
Backbench, Windhoek
Email: hjgeoenviro@gmail.com
Cell: +264811450613

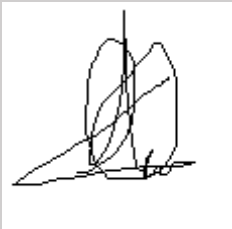
ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP):

Mr. J J Sirunda (BSc (Hon) and MSc)
POBOX 32237
Pioneerspark, Windhoek
Email: hjgeoenviro@gmail.com/johannes.sirunda@gmail.com
Cell: +264814112046

DECLARATION

I hereby declare that:

- a. I have the knowledge of and experience in conducting assessments, including knowledge of the Acts, regulations, and guidelines that are relevant to the proposed exploration project.
- b. I have performed the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant.

A handwritten signature in black ink, appearing to read 'J.J. Sirunda', is written over a white rectangular background.

Mr J.J Sirunda

Position: Environmental Assessment Practitioner (EAP)

REPORT/DOCUMENT CONTROL FORM**PROJECT NAME: EXPLORATION FOR MARBLE DIMENSION STONES QUARRY**

Document Title:	ENVIRONMENTAL MANAGEMENT PLAN FOR THE PROPOSED EXPLORATION STUDY FOR MARBLE AT CLAIM No: 69059 – 69060 ERONGO REGION, KARIBIB DISTRICT, NAMIBIA
------------------------	---

Document status:	Draft/Interim/Final: FINAL	Issue Date: 10 May 2021
-------------------------	-----------------------------------	-----------------------------------

Prepared for:	Client Name: Mr Melvin Pienaar	Contact Person: Mr. Melvin Pienaar POBOX 2 Usakos, Namibia
----------------------	--	--

Prepared by: Mr. J.J Sirunda**Verification by:** Mr. J.J Sirunda**Client approval:** Mr. Melvin Pienaar

Table of Contents

ABBREVIATIONS AND ACRONYMS	7
1. ENVIRONMENTAL MANAGEMENT PLAN.....	8
1.1. BACKGROUND.....	8
1.2. SUMMARY OF THE PROPOSED ACTIVITIES	8
1.3. WHAT IS AN EMP	8
1.4. OBJECTIVES OF THIS EMP	9
1.5. SCOPE OF THIS EMP	9
1.6. WHAT ARE THE LEGAL IMPLICATIONS AND OBLIGATIONS UNDER THIS PLAN? 10	
2. ANTICIPATED ENVIRONMENT IMPACTS.....	11
2.1. POSITIVE IMPACTS	11
2.1.1. EMPLOYMENT/JOB CREATION.....	11
2.1.2. SUPPORT TO LOCAL RETAILERS SHOP.....	11
2.1.3. EXPORT TAXES AND VAT PAYMENTS	12
2.2. NEGATIVE IMPACTS.....	12
2.2.1. LIQUID WASTE: OIL SPILLAGE AND WASTEWATER.....	12
2.2.2. SOLID WASTE: WIRES, DRILL BITS AND, HUMAN WASTE.....	13
2.2.3. LAND AND SOIL DISTURBANCE: ON-SITE AND THE PROPOSED 1KM STRETCH ROAD.....	14
2.2.4. BIODIVERSITY (FAUNA AND FLORA).....	15
2.2.5. AIR POLLUTION	17
2.2.6. NOISE POLLUTION.....	19
3. ENVIRONMENTAL MANAGEMENT PLAN ORGANIZATION AND IMPLEMENTATION ..	19
4. MONITORING EMP	2
5. ENVIRONMENTAL CODE OF CONDUCT	5
6. SITE CLOSURE AND REHABILITATION	9
6.1. OBJECTIVES OF THE SITE CLOSURE AND REHABILITATION.....	9
7. CONCLUSION AND RECOMMENDATIONS	10
7.1. CONCLUSION	10
7.2. RECOMMENDATION.....	11

8. REFERENCES..... 13

LISTS OF TABLES

Table 1: Project Planning and Implementation.....	21
Table 2: Mitigation measures during the exploration phase.....	0
Table 3: Mitigation measures during quarry (operation) phase.....	0
Table 4: Solid waste disposal: wire, paper, drill bits, and human waste	2
Table 5: Oil spillage or used oil	3
Table 6: Land and Soil Disturbance	3
Table 7: Dust generation on-site and gravel roads stretch	4
Table 8: Biodiversity (fauna and flora).....	4
Table 9: Noise and vibrations on-site	4
Table 10: Compliance.....	5
Table 11: Environmental Personnel Register.....	9

ABBREVIATIONS AND ACRONYMS

EMP	Environmental Management Plan
EIA	Environmental Impact Assessment
ECC	Environmental Clearance Certificate
EC	Environmental Commissioner
MET	Ministry of Environment and Tourism
DWA	Department of Water Affairs
DEAF	Department of Environmental Affairs and Forestry
ML	Mining License
CENC	Contractor Environmental Coordinator
PM	Project Manager
PP	Project Proponent
I&Aps	Interested and Affected Parties
EAs	Environmental Assessments
ECC	Environmental Clearance Certificate

1. ENVIRONMENTAL MANAGEMENT PLAN

1.1. BACKGROUND

The proponent is proposing to carry out an exploration study to quarry for Marble in in Usakos area, Karibib district, Erongo Region on mining claims numbers: **69059 – 69060**, respectively.

In line with the Environmental Management Act No.7 of 2007 and its Environmental Impact Assessment Regulation of 2012, the proposed project is a listed activity that cannot be undertaken without an environmental assessment. Therefore, it is required that an environmental assessment is carried out for the proposed project, to ensure the protection of the environment and community members found in that particular vicinity of the proposed project area. For this reason, an HJGeo-enviro Consulting and trading Cc was appointed to undertake an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the Exploration, Quarry (operational) and decommissioning phases of the exploration study for Marble on Mining claim numbers **69059 – 69060**, Erongo region, Namibia.

1.2. SUMMARY OF THE PROPOSED ACTIVITIES

The environmental issues related to small scale surface mining for Marble are mostly local and are common to most surface operations. These issues include oil spillage, dust or air pollution, impact on biodiversity, and land disturbance, impact on groundwater aquifer and also social-economic impacts. The quarrying operations processes and associated activities are as follows:

- Ground or land disturbances will take place and this will result in localized loss of flora as well as any other fauna that may be depended on such specific flora;
- Cutting, Drilling, trenching, and bulk sampling will be used in test mining for loosening the hard rock.
- The creation of access roads around the Mining Claim area;

1.3. WHAT IS AN EMP

An Environmental Management Plan (EMP) can be defined as “*an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the*

construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced". EMPs are therefore important tools for ensuring that the management actions arising from Environmental Impact Assessment (EIA) processes are clearly defined and implemented through all phases of the project life -cycle (construction, operation and decommissioning).

1.4. OBJECTIVES OF THIS EMP

The Environmental Management Plan (EMP) provides a detailed plan of action required in implementation of the mitigation measures for minimizing and maximizing the identified negative and positive impacts respectively. This EMP gives commitments including financial and human resources provisions for effective management of the likely environmental liabilities during and after the exploration. The specific objectives of this EMP are:

- Ensuring compliance with regulatory authority stipulations and guidelines;
- To formulate measures that will mitigate the adverse impacts of the proposed project on various environmental components, which have been identified during the environmental impact assessment.
- To formulate measures to protect environmental resources where possible.
- To formulate measures to enhance the value of environmental components where possible.
- Responding to changes in project implementation not considered in the EIA;
- Responding to unforeseen events; and
- Providing feedback for continual improvement in environmental performance.

1.5. SCOPE OF THIS EMP

To achieve the above objectives, the scope of this EMP will include the followings:

- Definition of the environmental management objectives to be realized during the life of a project (i.e. Exploration, quarry (operation) and/or decommissioning phases) in order to enhance benefits and minimize adverse environmental impacts.
- Description of the detailed actions needed to achieve these objectives, including how they will be achieved, by whom, by when, with what resources, with what monitoring/verification measures, and to what target or performance level.
- Clarification of institutional structures, roles, communication and reporting processes required as part of the implementation of the EMP.

- Description of requirements for record-keeping, reporting, review, auditing and updating of the EMP.

1.6. HIERACHY OF MITIGATION MEASURES IMPLEMENTATION

This EMP have adopted a hierarchy of methods for mitigating significant adverse effects identified in order of preference and as follows:

- i. Enhancement, e.g. provision of new habitats;
- ii. Avoidance, e.g. sensitive design to avoid effects on ecological receptors;
- iii. Reduction, e.g. limitation of effects on receptors through design changes, and;
- iv. Compensation, e.g. community benefits

1.7. MITIGATION MEASURES IMPLEMENTATION

The EMP provides a detailed plan of action required in the implementation of the mitigation measures for minimizing and maximizing the identified negative and positive impacts respectively. The EMP also provides the management actions with roles and responsibilities requirements for the implementation of environmental management strategies by the proponent through the contractors and subcontractors who will be undertaking the exploration activities

1.8. WHAT ARE THE LEGAL IMPLICATIONS AND OBLIGATIONS UNDER THIS PLAN?

The EMP will be sent to the Directorate of Environmental Affairs and Forestry (DEAF) of the Ministry of Environment, Forestry and Tourism (MEFT) for approval. Once the DEAF is satisfied with the contents of the EMP, they will issue an Environmental Clearance Certificate (ECC) to the Proponent to carry out the exploratory study to quarry for Marble in the Karibib district Area. The ECC is linked with the recommendations of the Environmental Management Plan.

Once the ECC is issued, the EMP becomes a legally binding document and each role-player including contractors and sub-contractors are made responsible to implement the relevant sections of the EMP and is required to abide by the conditions stipulated in this document.

2. ANTICIPATED ENVIRONMENT IMPACTS

2.1. POSITIVE IMPACTS

2.1.1. EMPLOYMENT/JOB CREATION

The Marble quarry will create both direct and indirect jobs. The sampling activities will employ about 20 people, whereas, the transporting, offloading and shipping of samples will create about 3 jobs. Indirect jobs will come from the multiplier effects of the pressure on disposal sites and upstream service providers to the proposed project.

2.1.1.1. ENHANCEMENT MEASURES FOR EMPLOYMENT/JOB CREATION

- Where unskilled labor can be used, a 'locals first' policy should be considered by the proponent.
- It is proposed that local people, meaning the community members from Usakos Town, should be employed as far as possible, especially where no specific skills are required.
- The Usakos Town Councilor could be requested to assist with the recruitment of construction workers.
- Both men and women should be granted the opportunity to be employed by this project.

2.1.2. SUPPORT TO LOCAL RETAILERS SHOP

Mining is the highest foreign currency earner and GDP contributor to the Namibian economy, therefore the presence of mining activities near local authorities stand to benefit the local economies from project-related purchases, for example, the retail, accommodation and recreation sectors.

2.1.2.1. ENHANCEMENT MEASURES FOR SUPPORT TO LOCAL RETAILERS SHOP

- The proponent and his employees are encouraged to purchase or support local retailers in Karibib and Usakos Towns unless the intended material/product to purchase is not available.

2.1.3. EXPORT TAXES AND VAT PAYMENTS

Export taxes and VAT payments contribute significantly to the national economic contribution. Thus, without these payments our government will not be able to roll out the project on infrastructure, being it water, road or electricity and also sanitation facilities nationwide.

2.1.3.1. ENHANCEMENT MEASURES FOR EXPORT TAXES AND VAT PAYMENTS

- The proponent and his employees are encouraged to make these payments when applicable to support the economic growth of the country.

2.2. NEGATIVE IMPACTS

2.2.1. LIQUID WASTE: USED OIL OR OIL SPILLAGE AND WASTEWATER

This risk associated with leaks or spillage of fuel at the mining site during the exploration and operation phase of the project has the potential of reaching both groundwater and surface water if there are active pathways. In addition, spillage is a concern although the likelihood of this risk occurrence is low; the impact if it happens is significant, for this reason, the risk is highlighted as a going concern of high priority and therefore mitigation measures to be taken are presented below:

2.2.1.1. EXPLORATION PHASE

- Contain spillage and remove the contaminated soil for storage into bags.
- Accessibility to spill prevention and response equipment, such equipment should be visible and accessible to all employees at any given time.

2.2.1.2. QUARRY (OPERATION) PHASE

- Accessibility to spill prevention and response equipment, such equipment should be visible and accessible to all employees at any given time.
- Spills will be cleaned up immediately to the satisfaction of the Regional Manager by removing the spillage together with the polluted soil and by disposing of them at a recognized facility.
- Designated waste collection tanks should be available on-site and away from waterways, and such isolation should be maintained at all times.

- Necessary response teams; such teams should be adequate to respond to possible risks of oil if it threatens fauna and flora.

2.2.2. SOLID WASTE: WIRES, DRILL BITS AND, HUMAN WASTE

Human activities at the mining site will to some extent produce litter, particularly small items that people throw away on the ground. Solid waste management is a challenge during the exploration and operational phases of projects of this nature. Therefore, proper handling and management of the waste are critical for the protection of the environment and surrounding communities. Solid waste which will be generated from this project if not managed will have an effect on the environment. The following are the mitigation measures to be taken to minimize the impact of solid waste during the exploration and operation of the project.

2.2.2.1. EXPLORATION PHASE

- Waste disposal sites should be established on-site where paper, plastic and wire should be kept during exploration and operation period.
- The collected solid waste should be disposed of at either the Karibib or Usakos Town Council solid waste disposal sites.
- For human waste, during the construction phase, the mobile toilet should be made available on-site for workers and once these facilities are full, the collected human waste should be disposed at the Karibib or Usakos Council human waste disposal site.
- Prior to the disposal of the above-mentioned waste by the Contractor must enter into an agreement with Karibib or Usakos Town Council for permission to use their facility.

2.2.2.2. QUARRY (OPERATION) PHASE

- Management of solid waste generated during the operation phase would include collection, transportation, and disposal in a manner so as to cause minimal environmental impact.
- It will be made mandatory for waste to be segregated right at the source of waste generation. The collection of segregated waste would be made from the quarrying site and amenity areas.

- Waste disposal sites for usage during the operation period to be included in the design of the quarrying project. If possible mobile waste disposal drum to be assigned at the project site.
- For human waste during the operation of the project, permanent ablution facility to be erected at the irrigation field with a proper lining of the collector to avoid any infiltration of the human waste into the underground aquifers.
- Prior to the disposal of the above-mentioned waste by the Contractor/the proponent must enter into an agreement with Karibib or Usakos Town Council for permission to use their facility.
- Reusable and recyclable waste will be disposed of by selling to scrap dealers and private contractors for resale.
- Non-degradable waste will be transferred to the municipal solid waste management system.

2.2.3. LAND AND SOIL DISTURBANCE: ON-SITE AND THE PROPOSED 1KM STRETCH ROAD

The sampling process will involve cutting out bulk samples from in situ Marble outcrops and therefore disturbing the landform and the soil cover in the immediate surroundings of the mining site. This undertaking will have a visual impact and has the potential of disturbing the structural integrity and biological productivity of topsoil.

2.2.3.1. EXPLORATION PHASE

- The access road to the mining area and the camp-site/site office must be established in consultation with the landowner and existing roads shall be used as far as practicable.
- The design, construction, and location of access to main roads will be in accordance with the requirements laid down by the controlling authority
- Should a portion of the access road be newly constructed the following must be adhered to:
 - The route shall be selected that a minimum number of bushes or trees are felled and existing fence lines shall be followed as far as possible.

- Watercourses and steep gradients shall be avoided as far as is practicable.
- Adequate drainage and erosion protection in the form of cut-off berms or trenches shall be provided where necessary.
- In order to protect the structural integrity and biological productivity of topsoil. The following must be followed:
 - The topsoil from 0 to 30cm to be removed and stockpile and to be used during the rehabilitation process.
 - The topsoil in the immediate vicinity of the sampling site should be removed and stored for re-cultivation during decommissioning.
 - It is recommended that topsoil to be removed down to the subsoil, where it is significantly thicker than 0.5m, as topsoil is always a scarce resource, and even if this lower material does not contain seed and is poorer in soil organisms, it has been found to be useful in reclamation.
 - Where topsoil is less than 150mm thick the unconsolidated material beneath should also be removed and treated as topsoil.

2.2.3.2. QUARRY (OPERATION) PHASE

- During the operation phase, No other routes will be used by vehicles or personnel for the purpose of gaining access to the site.
- Land markings and pits induced during sampling shall be restored to the original landform and, visual state as much as possible. Furthermore, this mitigation measure shall extend and applies to any disturbance induced by any access road. Raking or/and dragging with tyres could help in the restoration of vehicle tracks.
- In the case of dual or multiple uses of access roads by other users, arrangements for multiple responsibilities must be made with the other users. If not, the maintenance of access roads will be the responsibility of the holder of the mining permit.

2.2.4. BIODIVERSITY (FAUNA AND FLORA)

Some of the activities of the proposed project i.e. vehicles, human movements, excavating pose a risk to the integrity of baseline biodiversity as well as the biological productivity of the site and the immediate proximity. The following mitigations are to be undertaken to minimize the further impact on the existing biodiversity:

2.2.4.1. EXPLORATION PHASE

- Rules pertaining to safeguarding against poaching and collection of plant and plant products must be established and enforced.
- Remove (e.g. capture) unique fauna and sensitive fauna before commencing with the development activities and relocate to a less sensitive/disturbed site if possible.
- Where it is clear that certain large species will be destroyed consideration should be given to offering to rescue the individuals involved and relocate them to nearby gardens in either Karibib or Usakos.
- Prevent and discourage fires – especially during the exploration phase(s) – as this could easily cause runaway field fires and could affect the local fauna, and could also cause further problems (e.g. loss of grazing & domestic stock mortalities, etc.) for the neighboring farmers.
- The mining area must be clearly demarcated by means of beacons at its corners, and along its boundaries, if there is no visibility between the corner beacons and the quarrying of and prospecting for any mineral shall only take place within this demarcated mining area.

2.2.4.2. QUARRY (OPERATION PHASE)

- Disturbed areas must be kept to a minimum
- Barriers/barricades confining driving trucks must be erected to avoid stray driving and trampling on habitat
- Avoid damage to protected or high use value trees during mining and usage of heavy machines.
- Disturbance of marginal vegetation in the mountains should be limited.
- Avoid disturbance on invertebrate on-site and along the gravel road stretch.
- During operation avoid the creation of multiples roads strips, which could result in the disturbance of breeding sites for various mammals.
- Preferably workers should be transported in/out to the quarrying site on a daily basis to avoid excess damage to the local environment (e.g. fires, wood collection, poaching, etc.).

2.2.5. AIR POLLUTION (IMPACT ON AIR QUALITY ON SITE)

During the quarry (operation) phase, dust will be generated onsite by earth moving equipment and also on the gravel road by trucks and vehicles. Epidemiological studies indicate that workers exposed to construction process dust stand an increased risk of suffering from asthma symptoms, chronic bronchitis, nasal inflammation and impairment of lung function (Camici et al., 1978; Angotzi et al., 2005; Leikin et al., 2009).

2.2.5.1. QUARRY (OPERATION) PHASE

- The liberation of dust into the surrounding environment shall be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents.
- The speed of haul trucks and other vehicles must be strictly controlled to avoid dangerous conditions, excessive dust or excessive deterioration of the road being used.
- All gravel roads in quarry areas should have a speed limit of 60km/h for light vehicles and 30km/h for heavy vehicles in order to minimize the amount of dust generated by vehicles.
- Transportation of raw materials required for construction will be carried out during non-peak hours.
- Dust covers will be provided on trucks used for transportation of materials prone to fugitive dust emissions.
- Covering scaffolding and cleaning of vehicles that can reduce dust and vapor emissions will be used.
- Measures such as the use of wet processes enclosure of dust-producing processes under negative air pressure (slight vacuum compared to the air pressure outside the enclosure),
- Exhausting air containing dust through a collection system before emission to the atmosphere, and exhaust ventilation should be used in the workplace.
- Use of personal protective equipment for proper dust control for respiratory protection and should be used only where dust control methods are not yet effective or are inadequate.
- Direct skin contact should be prevented by gloves, wearing respiratory protection during the cleanup,

2.2.6. ARCHAEOLOGICAL IMPACT

Heritage resources may be impacted through unintentional destruction or damage, during exploration activities. Furthermore, there was no information provided about known heritage or site of cultural values within the project site. Therefore, this impact can be rated medium to low, if there are no mitigation measures in place. At the sites, there are no known heritage areas or artefacts deemed to be impacted by the exploration activities. However, there might be unknown archaeological remains within the mining claims area hence the Proponent is required to follow the chance find procedures and consult the Heritage Council immediately. Upon implementation of the necessary measures, the impact will be low.

The Proponent should consider having a qualified and experience archaeologist on standby during exploration work and sampling phase and as required during the entire operational phase. This action will be to assist on the possibility of uncovering sub-surface graves or other cultural/heritage objects and advice the Proponent accordingly. Identified graves or any archaeological significant objects on the site should not be disturbed, but are to be reported to the project Environmental officer or National Heritage Council offices. If discovery of unearthed archaeological remains to be uncovered, the following measures (chance find procedure) shall be applied:

- Works to cease, area to be demarcated with appropriate tape by the site supervisor, and the Site Manger to be informed
- Site Manager to visit the site and determine whether work can proceed without damage to findings, mark exclusions boundary
- If work cannot proceed without damage to findings, Site Manager is to inform the Environmental Manager who will get in touch with an archaeologist for advice
- Archaeological specialist is to evaluate the significance of the remains and identify appropriate action, for example, record and remove; relocate or leave in situ (depending on the nature and value of the remains) - Inform the police if the remains are human, and
- Obtain appropriate clearance or approval from the competent authority, if required, and recover and remove the remains to the National Museum or National Forensic Laboratory as appropriate.

2.2.7. NOISE ON SITE

Noise emissions are commonly associated with all earthmoving equipment and drilling activities. The main noise sources are associated with drilling, breaking, crushing and handling–moving, screening, and transport of equipment or materials to or from the quarry site.

2.2.7.1. QUARRY (OPERATION) PHASE

- Reduction of noise from drilling rigs by using downhole drilling or hydraulic drilling;
- Installation of proper sound barriers and (or) noise containments, with enclosures and curtains at or near the source equipment.
- Use of rubber-lined or soundproof surfaces on processing equipment (e.g. screens, chutes, transfer points, and buckets);
- Use of rubber-belt transport and conveyors;
- Installation of natural barriers at facility boundaries (e.g. Vegetation curtains or soil berms);
- Optimization of internal-traffic routing, particularly to minimize vehicle-reversing needs (reducing noise from reversing alarms) and to maximize distances to the closest sensitive receptors;
- Workers working near high noise mining machinery will be provided with ear muffs/ earplugs.

3. ENVIRONMENTAL MANAGEMENT PLAN ORGANIZATION AND IMPLEMENTATION

During the exploration phase, contractors, as well as site-in-charge, will be responsible for implementing all the mitigation measures mentioned above. In the operational phase, the work will be continued along with post monitoring. In the preceding sections, the environmental aspects which may be affected by the proposed project have been categorized into negative and positive impacts. As an extension of the preceding sections, this section summarizes the objectives, indicators to be observed, schedules to adhere to, and the roles and responsibilities of various stakeholders to the EMP. The following tables give the mitigation measure to be undertaken during the exploration & operational phase respectively with the agency responsible for implementation.

The following abbreviations are used to indicate who is responsible for what impact mitigation objective:

- **Contractor Environmental Coordinator** **CENC**
- **Site Foreman** **SF**
- **Project manager** **PM**
- **Project Proponent** **PP**
- **Environmental Commissioner** **EC**

Table 1: Project Planning and Implementation

Objectives	Indicators	Schedule	Responsibility
Establish a strong environmental protocol from project implementation to final closure to ensure the least possible impacts on the environment	Resources (Financial, human, equipment and safety gear) are provided for the awareness, meetings, monitoring, and reporting.	At the beginning of the quarrying phase.	PP
To maximize the economic spin-off into the local economy.	Expedite the appointment of a senior person to assume the responsibility of an environmental coordinator (ENC)	At the planning stage or at the beginning of the implementation phase of the quarrying phase	PP

Table 2: Mitigation measures during the exploration phase

No	Affected Environmental Parameters	Likely adverse impacts in the absence of mitigation measures	Nature of the impact	Proposed mitigation measures	
				Action to be taken	Implementing agency
1	Land Environment	Impact on fauna and flora	Significant and permanent if not controlled	Avoid construction within 20m of the main drainage line(s). Avoid disturbance of marginal vegetation Remove (e.g. capture) unique fauna	Contractor/CENC
		Generation of solid waste and debris. Aesthetically unpleasant. Health problems of laborers	Temporary	Segregation to facilitate reuse/ recycling. Recyclable wastes will be segregated and sent for recycling. Adequate facilities for the storage of these waste materials on site	Contractor/CENC
2	Air Quality	Traffic congestion Increase air pollution risks	Significant and temporary	Idling of the trucks and dumpers on the roads will not be allowed.	Project manager/Contractor/CENC

				<p>Raw materials will be procured from the nearest material supplier.</p> <p>Material will be brought in batches so that there is no sudden increase of traffic volume at one particular time.</p> <p>On-site use of Concrete batching plant.</p> <p>Use of dust covers over construction material during transportation. Keeping all stationary equipment downwind.</p> <p>Stabilization of dust prone areas by sprinkling water</p>	
3	Noise Quality	Increase in noise levels causing a nuisance to the nearby	Significant and temporary	Prohibition for use of equipment emitting noise of greater than	Project manager/Contractor/CENC

		Community Members/farm		<p>90 dB (A) for 8 hour operation.</p> <p>Prohibition of noise from construction activities during night time.</p> <p>Provide workers on machinery with ear muffs/ earplugs.</p> <p>Provision of temporary barricading around site</p>	
4	Water Environment	<p>Surface and groundwater pollution due to fuel spillage.</p> <p>Turbidity and suspended solids due to soil erosion.</p> <p>Blocking of natural drains due to the deposition of construction materials.</p>	Significant and temporary	<p>Mining to be carried out before periods of strong winds and erosion protection measures to be taken.</p> <p>Mining materials to be stored in enclosures.</p> <p>Cleaning of drains on</p>	Contractor/CENC

				regular basis to avoid blockage. No accumulation of stagnant water	
5	Other Impacts	Soil erosion, additional exposure to noise/ air pollution	Significant and permanent	Construction of necessary scaffolding and retaining structure for protection from waste material and water. Tree plantation to enhance bio aesthetic value. Guidelines for planting saplings of trees to be strictly followed.	Contractor/CENC
6	Spillage of oil management	Contamination of surface and groundwater	Significant and permanent	Contain spillage and remove the contaminated soil. Accessibility to spill prevention and response equipment, such equipment should be visible and accessible to all employees at any given time.	Contractor/CENC

--	--	--	--	--	--

Table 3: Mitigation measures during quarry (operation) phase

No	Affected Environmental Parameters	Likely adverse impacts in the absence of mitigation measures	Nature of the impact	Proposed mitigation measures	
				Action to be taken	Implementing agency
1	Land Environment	Change in land use pattern due to the proposed quarry project	Significant and permanent if not controlled	Controlled and planned quarrying system	Project Proponent
		Contamination of soil by fuel and lubricants from construction equipment and vehicles. Increased solid waste generation in the area. If not managed properly will affect the health of local residents.	Significant and temporary	Avoiding spillage of oil and fuel to prevent seepage into ground and reaching surface water bodies. Waste management practices like waste segregation at source, recycling and reuse, mechanical composting etc. will be adopted Provision of mechanical composting units within the site. Regular collection of non-degradable solid waste from the site. Provision of a well	Project Proponent

				engineered landfill site.	
4	Water Environment	<p>Water shortage within the area.</p> <p>Water flooding during rainy season.</p> <p>Increase in turbidity of water</p> <p>Reduced runoff due to increased paved areas.</p>	Significant and permanent	<p>Blockage of natural drains to be avoided and cleaning and maintenance to be carried out.</p> <p>Regular maintenance of stormwater drains, cleaning and effective soil erosion measures.</p> <p>Water harvesting to recharge on-site to be encouraged for use during the period of pumping failure.</p> <p>Prevent pollution from run-off.</p> <p>Sewage treatment plants to recycle domestic sewage and reuse for toilet flushing/</p>	Project Proponent
5	Public Health and Safety	Health problems to people staying	Moderate and Permanent	Road maintenance to prevent air/ noise pollution	Project Proponent

		within the plots.		within site. Provision of adequate road safety like signage- posts/ road-crossings etc. Firefighting / Disaster Management Plan provisions for buildings.	
--	--	-------------------	--	---	--

4. MONITORING EMP

Monitoring of the EMP performance for the proposed project by the Contractor emphasizes early dictation, reporting, and corrective action. It is divided into three parts, namely:

- Monitoring of project activities and actions to be undertaken by the Environmental Coordinator (ENC) appointed by the Contractor.
- The Environmental Coordinator (ENC) shall report all incidents and situations which have the potential of jeopardizing compliance of statutory provisions as well as provisions of this EMP to the Project Proponent.
- The Environmental Coordinator (ENC) shall take corrective prompt measures, adequate and long-lasting in addressing non-compliance activities or behavior.

To ensure compliance of the Contractor ENC to the implementation of the EMP, it is highly recommended that an External Environmental Expert is appointed by the proponent to ensure the implementation of the EMP. The tables (5-9) provided below are to be used for monitoring purposes by the Contractor's ENC.

Table 4: Solid waste disposal: wire, paper, drill bits, and human waste

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are disposal drums/bins available or					

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
full?					
Is there any litter around the site and its surroundings?					

Table 5: Oil spillage or used oil

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are disposal drums available or full?					
Is there any oil spills around the site and its surroundings?					

Table 6: Land and Soil Disturbance

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on land and soil disturbance?					
Are car track barricades in place?					

Table 7: Dust generation on-site and gravel roads stretch

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on dust pollution?					
Are the fume and particulate levels acceptable?					

Table 8: Biodiversity (fauna and flora)

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on biodiversity?					
It is traipses harvesting plant taking place feeding of animal or introduction of animals?					

Table 9: Noise and vibrations on-site

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the					

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
EMP on noise and vibration on-site?					
Are there any complaints from the surroundings neighbor about noise emanating from the sites or tracks transporting materials/produce?					

Table 10: Compliance

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on noise and vibration on-site?					
Are there any complaints from the surroundings neighbor about noise emanating from the sites or tracks transporting materials/produce?					

5. ENVIRONMENTAL CODE OF CONDUCT

The Code of Conduct outlined in this section of the EMP applies and is not limited to, subcontractors, visitors, permanent and temporal workers. Therefore, anybody who finds him or herself within the boundaries of the proponent must adhere to the Environmental Code of Conduct as outlined in this section of the EMP.

- The Contractor ENC will implement on-site environmental guidelines and has the authority to issue warnings as well as discipline any person who transgresses

environmental rules and procedures. Persistent transgression of environmental rules will result in a disciplinary hearing and thereafter continued noncompliance behavior will result in permanent removal from the construction sites.

Natural environment management guidelines

- a. Never feed, tease or play with, hunt, kill, destroy or set devices to trap any wild animal (including birds, reptiles and mammals), livestock or pets. Do not bring any wild animal or pet to the construction sites;
- b. Do not pick any plant or take any animal out of the construction area EVER. You will be prosecuted and asked to leave the project area;
- c. Never leave rubbish and food scraps or bones where it will attract animals, birds or insects. Rubbish must be thrown into the correct rubbish bins or bags provided;
- d. Protect the surface material by not driving over it unnecessarily;
- e. Do not drive over, build upon, or camp on any sensitive habitats for plants and animals;
- f. Do not cut down any part of living trees/bushes for firewood;
- g. Do not destroy bird nest, dens, burrow pits, termite hills, etc. or any other natural objects in the area.

Vehicle use and access guidance

- i. Never drive any vehicle without a valid license for that particular vehicle and do not drive any vehicle that appears not to be road-worthy;
- ii. Never drive any vehicle when under the influence of alcohol or drugs;
- iii. DO NOT make any new roads without permission. Stay within demarcated areas;
- iv. Avoid U-Turns and large turning circles. 3-point turns are encouraged. Do not ever drive on rocky slopes;
- v. Stay on the road, do not make a second set of tracks and do not cut corners;
- vi. DO NOT SPEED - 30 km per hour for normal vehicles and 20km per hour for heavy trucks on gravel roads and around the site;
- vii. No off-road driving is allowed;
- viii. Vehicles may only drive on demarcated roads;

- ix. Adhere to speed limits and drive with headlights switched on along any gravel road.

Control of dust guidance

- a. Do not make new roads or clear any vegetation unless instructed to do so by your Contractor or the Environmental Coordinator or Site Manager;
- b. Do not try to disturb the surface of the natural landscape as little as possible.
- c. Do not speed on gravel roads and around the construction sites, and adhere to the speed limits.
- d. Apply water to suppress dust where the generation of the dust on either gravel roads or construction sites is beyond control.

Health and safety guidance

- a. Drink lots of water every day, but only from the freshwater supplies;
- b. Take the necessary precautions to avoid contracting the HIV/AIDS virus;
- c. Never enter any area that is out of bounds, or demarcated as dangerous or wander off without informing or permission of team leader;
- d. Never climb over any fence or trespass on private property without permission of the landowner or consultation with the Environmental Coordinator, Site Manager.
- e. Report to your Contractor if you see a stranger or unauthorized person in the construction area;
- f. Do not remove any vehicle, machinery, equipment or any other object from the construction campsite or along with the profile or at a seismic testing station without permission of your Contractor or Site Manager;
- g. Wear protective clothing and equipment required and according to instructions from your Contractor or Site Manager;
- h. Do not engage in sexual relations with minors and also adheres to zero tolerance to spread HIV/AIDS.

Preventing pollution and dangerous working conditions guidance

- I. Never throw any hazardous substance such as fuel, oil, solvents, etc. into streams or onto the ground;
- II. Never allow any hazardous substance to soak into the soil;

- III. Immediately tell your Contractor or Environmental Coordinator when you spill or notice any spillage of hazardous substance anywhere in the field or camp;
- IV. Report to your Contractor or Environmental Coordinator when you notice any container, which may hold a hazardous substance, overflow, leak or drip;
- V. Immediately report to your Contractor or Environmental Coordinator when you notice overflowing problems or unhygienic conditions at the ablution facilities, vehicles, equipment and machinery, containers and other surfaces.

Disposal of solid and liquid waste guidance

- a. Learn to know the difference between the two main types of waste, namely: General Waste; and Hazardous Waste.
- b. Learn how to identify the containers, bins, drums or bags for the different types of wastes. Never dispose of hazardous waste in the bins or skips intended for general waste or construction rubble;
- c. Never burn or bury any waste on the camp or in the field;
- d. Never overfill any waste container, drum, bin or bag. Inform your Contractor or the Environmental Coordinator/ Site Manager if the containers, drums, bins or skips are nearly full;
- e. Never litter or throwaway any waste on the site, in the field or along any road.
- f. No illegal dumping;
- g. Littering is prohibited.

Dealing with environmental complaints guidance

- a. If you have any complaint about dangerous working conditions or potential pollution to the environment, immediately report this to the Environmental Coordinator
- b. If any person complains to you about noise, lights, littering, pollution, or any other harmful or dangerous condition, immediately report this to your Contractor.

Environmental Personnel Register

Table 11 presents the Environmental Personnel Register to be signed by every person who receives or attends the Environmental Awareness Training or who has the training material explained to him or her or in possession of the training material.

Table 11: Environmental Personnel Register

Date	Name	Company	Signature

6. SITE CLOSURE AND REHABILITATION

In the context of the proposed project, rehabilitation refers to the process of returning disturbed land and soil to some degree of its pristine state. The scope of the proponent site rehabilitation emphasizes the backfilling of sampling/drilling holes and cover with topsoil in areas that will be disturbed by mining/ quarrying activities. These will be but not limited to the access road, vehicle tracks around the site, removal, and restoration of areas covered by stockpile and rock piles. Furthermore, this section outlines rehabilitation objectives and proposes rehabilitation commitments which the proponent shall adhere to.

6.1. OBJECTIVES OF THE SITE CLOSURE AND REHABILITATION

- Reduction or elimination of the need for a long term management program to control and minimize the long term impacts.
- Clean up, treatment or restoration of disturbed or/and contaminated areas.

In addition, the following rehabilitation measures are important and should be implemented wherever necessary:

- A site inspection will be held after completion of the mining process to determine the nature and scope of the rehabilitation work to be undertaken. The rehabilitation will be done to the satisfaction of both the proponent and MET.
- The rehabilitation work should commence soon after the end of the active mining period.
- The access road and all vehicle tracks should be rehabilitated by raking or dragging with tyres or tree branches (other suitable methods) behind a vehicle.
- With regard to both biological productivity and erosion, topsoil is arguably the most important resource in the project area, for that reason, the recovered topsoil and subsoil should be utilized to reconstruct the original soil profile.
- All waste shall be removed, and potential hazards particularly pits closed and left in a safe disposition.
- All rehabilitated areas shall be considered no go areas and the environmental coordinator shall ensure that none of the staff members enters the area after rehabilitation.

7. CONCLUSION AND RECOMMENDATIONS

7.1. CONCLUSION

The fundamental principle behind environmental assessments (EAs) is to ensure a balance in social, economic and environmental needs, particularly when proposed projects are of such a nature that they negatively affect some needs at the expense of the other. Ultimately, EAs should enhance proposed projects' propensity towards being more beneficial and important by suggesting measures, designing and implementing programs and plans to that effect.

Against this background, it is anticipated that this project will be beneficial and important to the proponent, national economy, the local social conditions, and the local economy if the guidelines and mitigation measures suggested in this EMP are implemented. However, it should be acknowledged that disturbance to the environment will be incurred, but that will be minimal and within legally acceptable levels.

This EMP should be viewed as a framework for integrating mitigation measures and applicable legal tools to ensure both compliance and sustainability. It is therefore very important that the proponent provides adequate resources (human, financial, tangible and intangible assets) for the implementation of the plan.

7.2. RECOMMENDATION

The proposed quarry project may go ahead provided that all the provisions of the EMP, as well as all issued permits, are followed. Recommended actions to be implemented by the proponent as part of the management of the likely impacts through implementations of the EMP are:

- Contract an Environmental Coordinator / Consultant / suitable in-house resources person to lead and further develop, implement and promote environmental culture through awareness-raising of the workforce, contractors and sub-contractors in the field during the whole duration of the proposed mining program period;

- Provide with other support, human and financial resources, for the implementation of the proposed mitigations and effective environmental management during the planned mining activities ;
- Develop a simplified environmental induction and awareness program for all the workforce, contractors and sub-contractors;
- Where contracted service providers are likely to cause environmental impacts, these will need to be identified and contract agreements need to be developed with costing provisions for environmental liabilities;
- Implement internal and external monitoring of the actions and management strategies developed during the mineral exploration and possible mining duration and a final Environmental Monitoring report be prepared by the Environmental Coordinator / Consultant / Suitable in-house resource person and to be submitted to the regulators and to end the proposed quarry project;
- Develop and implement a monitoring program that will fit into the overall company's Environmental Management Systems (EMS) as well as for any future EIA for possible quarrying projects.

It is hereby recommended that proponent take all the necessary steps to implement all the recommendations of the EMP for the successful implementation and completion of the proposed quarry project for claims **69059 – 69060** situated in the Karibib district, Erongo Region, Namibia.

8. REFERENCES

- Ashmole, I. (2004). "Dimension Stone: The Small Scale Mining Potential in South Africa", Paper presented at Small Scale Mining, Johannesburg.
- Barnard, P. (1998). Under protected habitats. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Bester, B. (1996). Bush encroachment – A thorny problem. *Namibia Environment* 1: 175-177.
- Bethune, S., Shaw, D. & Roberts, K.S. (2007). *Wetlands of Namibia*. John Meinert Printing, Windhoek.
- Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Boycott, R.C. & Bourquin, O. (2000). *The Southern African Tortoise Book*. O Bourquin, Hilton, RSA...
- Branch, B. (1998). *Field guide to snakes and other reptiles of southern Africa*. Struik Publishers, Cape Town, RSA.
- Branch, B. (2008). *Tortoises, terrapins & turtles of Africa*. Struik Publishers, Cape Town RSA.
- Broadley, D.G. (1983). *Fitzsimons' Snakes of southern Africa*. Jonathan Ball & AD. Donker Publishers, Parklands, RSA.
- Brown, C.J., Jarvis, A., Robertson, T. & Simmons, R. (1998). Bird diversity. In: Barnard, P. (ed.). *Biological diversity in Namibia: a country study*. Windhoek: Namibian National Biodiversity Task Force.
- Burke, A. (1998). Vegetation zones. In: Barnard, P. (ed.). *Biological diversity in Namibia: a country study*. Windhoek: Namibian National Biodiversity Task Force.
- Burke, A. (2003). *Wildflowers of the Central Namib*. Namibia Scientific Society, Windhoek.
- Buys, P.J. & Buys, P.J.C. (1983). *Snakes of Namibia*. Gamsberg Macmillan Publishers, Windhoek, Namibia.
- Carruthers, V.C. (2001). *Frogs and frogging in southern Africa*. Struik Publishers, Cape Town, RSA.
- Carvalho, J.F., Henriques, P., Fale, P., Luis, G., (2008). "Decision criteria for the exploration of ornamental-stone deposits: Application to the marbles of the Portuguese Estremoz Anticline", *International Journal of Rock Mechanics and Mining Sciences*.

- Channing, A. & Griffin, M. (1993). An annotated checklist of the frogs of Namibia. *Madoqua* 18(2): 101-116.
- Channing, A. (2001). *Amphibians of Central and Southern Africa*. ProteaBookhouse, Pretoria, RSA.
- Coats Palgrave, K. (1983). *Trees of Southern Africa*. Struik Publishers, Cape Town, RSA.
- Curtis, B. & Barnard, P. (1998). Sites and species of biological, economic or archaeological importance. In: Barnard, P. (ed.). *Biological diversity in Namibia: a country study*. Windhoek: Namibian National Biodiversity Task Force.
- Curtis, B. & Mannheimer, C. (2005). *Tree Atlas of Namibia*. National Botanical Research Institute, Windhoek, Namibia.
- De Graaff, G. (1981). *The rodents of southern Africa*. Butterworths, RSA.
- De Lukas, M, Janss, G.F.E., Whitfield, D.P. & Ferrer, M. (2008). Collision fatality of raptors in wind farms does not depend on raptor abundance. *Journal of Applied Ecology* 45(6): 1695-1703.
- Department of Water Affairs (DWA). (2002). *The hydrogeological map of Namibia*
- Du Preez, L. & Carruthers, V. (2009). *A complete guide to the frogs of southern Africa*. Struik Publishers, Cape Town, RSA.
- Electricity Control Board (ECB). (2009), *Annual Report*, Windhoek, Namibia.
- IUCN. (1996). *IUCN red list of threatened animals*, IUCN, Gland, Switzerland.
- IUCN. (2004). IUCN, Gland, Switzerland. In: Griffin, M. 2005. *Annotated checklist and provisional national conservation status of Namibian mammals*. Ministry of Environment and Tourism, Windhoek.
- Joubert, E. & Mostert, P.M.K. 1975. Distribution patterns and status of some mammals in South West Africa. *Madoqua* 9(1): 5-44.
- Kisting, J., 2008. *Opportunities in the renewable energy sector in Namibia*, Baobab Equity Management (Pty) Ltd, Windhoek, Namibia
- Mendelson, J., Jarvis, A., Roberts, C., and Robertson, T. (2002). *Atlas of Namibia: A portrait of the land and its people*. Windhoek, Namibia: Ministry of Environment and Tourism.
- Miller, R. (2008). *The geology of Namibia, neoproterozoic to lower palaeozoic*
- Miller, R. McG., (1983a). The Pan – African Damara Orogen S.W.A. / Namibia, Special Publication of the Geological Society of South Africa, 11, 431 - 515.
- Miller, R. McG., (1983b). Economic implications of plate tectonic models of the Damara Orogen, Special Publication of the Geological Society of South Africa, 11, 115 -138.

- Miller, R. McG., (1992). Stratigraphy. The mineral resource of Namibia, Geological Survey of Namibia, Ministry of Mines and Energy, Windhoek, 1.2 .1 -1.2.13.
- Ministry of Environment and Tourism. The Republic of Namibia. (2008). Guide to the Environmental Management Act No. 7 of 2007. 56 pp
- Ministry of Environment and Tourism. The Republic of Namibia. (2012). Environmental Impact Assessment Regulation: Environmental Management Act, 2007. Government Gazette No.4878.
- NamPower, 2010. Network Map ([www. nampower.com.na](http://www.nampower.com.na)) – Retrieved on 06th February 2014.
- Ransom, A. H., (1981). Interim Report on Prospecting Grant No. M46/3/758 – Tumas Project No. 53 - Namib Desert Park – Namibia, Period April 1978 - April 1981, Falconbridge of S.W.A. (PTY) LTD, Bulletin No. 2267 (Annex 4).
- Republic of Namibia. (2005). Namibia's Environmental Assessment Policy for Sustainable Development and Environmental Conservation.
- Republic of Namibia. (2007). Environmental Management Act No. 7 of 2007. Government Gazette No. 3966.
- Richards, J.P. (2009). Mining society and a sustainable world. Springer, New York.
- Risk Based Solution. (2011). Final EIA and EMP for the proposed exploration and possible testing a mine for the EPL no-4458, Karas Region. Swedish Exploration.
- SARDB, 2004. CBSG Southern Africa. In: Griffin, M.(2005). Annotated checklist and provisional national conservation status of Namibian mammals. Ministry of Environment and Tourism, Windhoek.
- Shadmon, A., (1993). "Dimension Stone - its Impact on environment and constructional applications the role of engineering geology", Bulletin of the International Association of Engineering Geology, No 48, pp 119-122.
- Simmons R.E. & Brown C.J. (2009). Birds to watch in Namibia: red, rare and endemic species. National Biodiversity Programme, Windhoek.
- Simmons, R.E. (1998a). Important Bird Areas (IBA's) in Namibia. In: Barnard, P. (ed.).
- Simmons, R.E. (1998b). Areas of high species endemism. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.
- Simmons, R.E. (1998c). Flamingos: declining in southern Africa. In: Barnard, P. (ed.). Biological diversity in Namibia: a country study. Windhoek: Namibian National Biodiversity Task Force.

- Skinner, J.D. & Smithers, R.H.N. (1990). The mammals of the southern African subregion. University of Pretoria, RSA.
- Steven, N. M., (1993). A study of epigenetic mineralization in the Central Zone of the Damara Orogen, Namibia, with special reference to gold, tungsten, tin, and rare earth element. Geological Survey of Namibia, Memoir 16, 166 pp.
- Tapscott, C., (1999). An overview of the socio-economics of some key maritime industries in the Benguela Current region. A Report Prepared on Behalf of the Benguela Current Large Marine Ecosystem Project, Windhoek, October 1999