



**Environmental Management Plan (EMP):**

**Proposed Establishment of a Small to Medium Scale Quarry for Dimension Stone Production on Mining Claims 72499, 72500, 72501, 72502 and 72503 in the Karibib Constituency, Erongo Region, Namibia**

<b>MEFT APPLICATION NO.:</b>	<b>APP-003007</b>
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## TABLE OF CONTENTS

<b>TABLE OF CONTENTS</b> .....	i
<b>LIST OF FIGURES</b> .....	ii
<b>LIST OF APPENDICES</b> .....	ii
<b>LIST OF ABBREVIATIONS AND MEANINGS</b> .....	iii
1 INTRODUCTION.....	1
1.1 Brief Project Background .....	1
1.2 Project Location .....	1
1.3 Mining Claims Ownership and Land Tenure.....	3
1.4 Purpose of the Environmental Management Plan (EMP) .....	4
1.5 The Environmental Consultant.....	5
1.6 Limitations of the Draft Environmental Management Plan (EMP) .....	5
2 BRIEF PROJECT DESCRIPTION, ACTIVITIES AND PROCESSES.....	6
2.1 Desired Properties, Application and Uses.....	6
2.2 Mine Preconstruction .....	6
2.3 Mine Construction and Operations .....	7
2.3.1 Mine Design and Construction.....	7
2.3.2 Mine Operations (Extracting the Marble).....	8
2.3.3 Stone Handling and Transportation .....	8
2.4 Rehabilitation .....	9
3 EMP IMPLEMENTATION AND RESPONSIBILITIES.....	9
3.1 The Project Site Manager (or the Proponent) .....	9
3.2 Safety, Health and Environmental (SHE) Officer .....	10
3.3 Public Relation Officer (PRO).....	10
4 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN ACTIONS.....	10
4.1 Applicable Legislation: Authorisation (Permits and Licenses).....	11
4.2 Impact Enhancement/ Mitigation Actions and Monitoring .....	14
4.3 Rehabilitation Measures After Site Closure.....	27
4.4 A Quick Guide on Monitoring of EMP Implementation.....	33
5 RECOMMENDATIONS AND CONCLUSIONS .....	36
6 CERTIFICATION .....	<b>Error! Bookmark not defined.</b>

**Environmental Management Plan: Quarrying of Dimension Stone on Mining Claims 72499, 72500, 72501, 72502 and 72503**

**LIST OF FIGURES**

Figure 1-1: Locality map of MC 72499, 72500, 72501, 72502 and 72503 in the Erongo Region. .... 2

**LIST OF TABLES**

Table 1-1: Approximate GPS Coordinates of MC 72499, 72500, 72501, 72502 and 72503..... 3

Table 4-1: Applicable legislations in terms of permitting or licensing requirements for the proposed activities. .... 11

Table 4-2: Management Plan Actions for the Development, Operational, and Decommissioning Phases of the Project..... 15

Table 4-3: Rehabilitation Measures After Site Closure. .... 28

**LIST OF APPENDICES**

**Appendix 1:** Chance Finds Procedure (Archaeological and Heritage Management)

## LIST OF ABBREVIATIONS AND MEANINGS

<b>List of Abbreviations</b>	
<b>DEFA</b>	Department of Environmental and Forestry Affairs
<b>CC</b>	Close Corporation
<b>CFP</b>	Chance Finds Procedure
<b>COVID-19</b>	Coronavirus disease (COVID-19) an infectious disease caused by a newly discovered coronavirus.
<b>DEA</b>	Department of Environmental Affairs and Forestry
<b>EA</b>	Environmental Assessment
<b>ECC</b>	Environmental Clearance Certificate
<b>EIA</b>	Environmental Impact Assessment
<b>ESA</b>	Environmental Scoping Assessment
<b>EMP</b>	Environmental Management Plan
<b>EMA</b>	Environmental Management Act
<b>EPL</b>	Exploration Prospecting License
<b>ESA</b>	Environmental Scoping Assessment
<b>I&amp;APs</b>	Interested and Affected Parties
<b>IUCN</b>	International Union for Conservation of Nature
<b>MAWLR</b>	Ministry of Agriculture, Water & Land Reform
<b>MEFT</b>	Ministry of Environment, Forestry and Tourism
<b>MLIEC</b>	Ministry of Labour, Industrial Relations and Employment Creation
<b>MME</b>	Ministry of Mines and Energy
<b>MURD</b>	Ministry of Urban and Rural Development
<b>MWT</b>	Ministry of Works and Transport
<b>MURD</b>	Ministry of Urban and Rural Development
<b>NHC</b>	National Heritage Council
<b>OMAVI</b>	OMAVI Geotechnical and Geo-environmental Consultants cc
<b>PPE</b>	Personal Protective Equipment
<b>TA</b>	Traditional Authority

# **1 INTRODUCTION**

## **1.1 Brief Project Background**

Herman Honeb (herein "the Proponent") intends to establish a small to medium scale marble dimension stone quarry on mining claims 72499, 72500, 72501, 72502 and 72503 located on Farm Onguati No. 52 and 53 in the Karibib District, Erongo Region, Namibia. Marble is crystalline rock composed predominantly of calcite, dolomite, or serpentine that is capable of taking a polish. It is extensively used for sculpture, as a building material, and in many other applications.

Namibia's dimension stone production is renowned for its finest quality marble which is exported to varying parts of Europe, America and Asia. The dimension stone industry in Namibia has been in existence since the early years of this century, however its potential has not yet been fully developed.

The rapid growth in the production and demand of dimension stone has resulted in rapidly increasing environmental impact of the industry, especially in terms of the increasing number of quarries disturbing the natural environment.

Quarrying of dimension stone is a listed activity and in accordance with the Environmental Management Act 2007 and Environmental Impact Assessment (EIA) Regulations (EIAR) (GG No. 4878), may not be undertaken without an Environmental Clearance Certificate (ECC). The commencement of the proposed project activities is subject to the issuance of an ECC by the Ministry of Environment and Tourism.

This EMP has been developed to provide a management framework for the planning and management of the proposed quarrying activities. This EMP provides mitigation measures to ensure that the potential environmental and social impacts are kept to tolerable limits, prevented and/or minimised as far as reasonably practicable, and that statutory requirements and other legal obligations are fulfilled.

## **1.2 Project Location**

Mining claims 72499, 72500, 72501, 72502 and 72503 are situated 14 km NW of Karibib on Farm Onguati No. 52 and 53 and covers a total area of 84 Ha. The locality map showing the Mining Claims and the farms it overlies are shown in Figure 1-1 below.

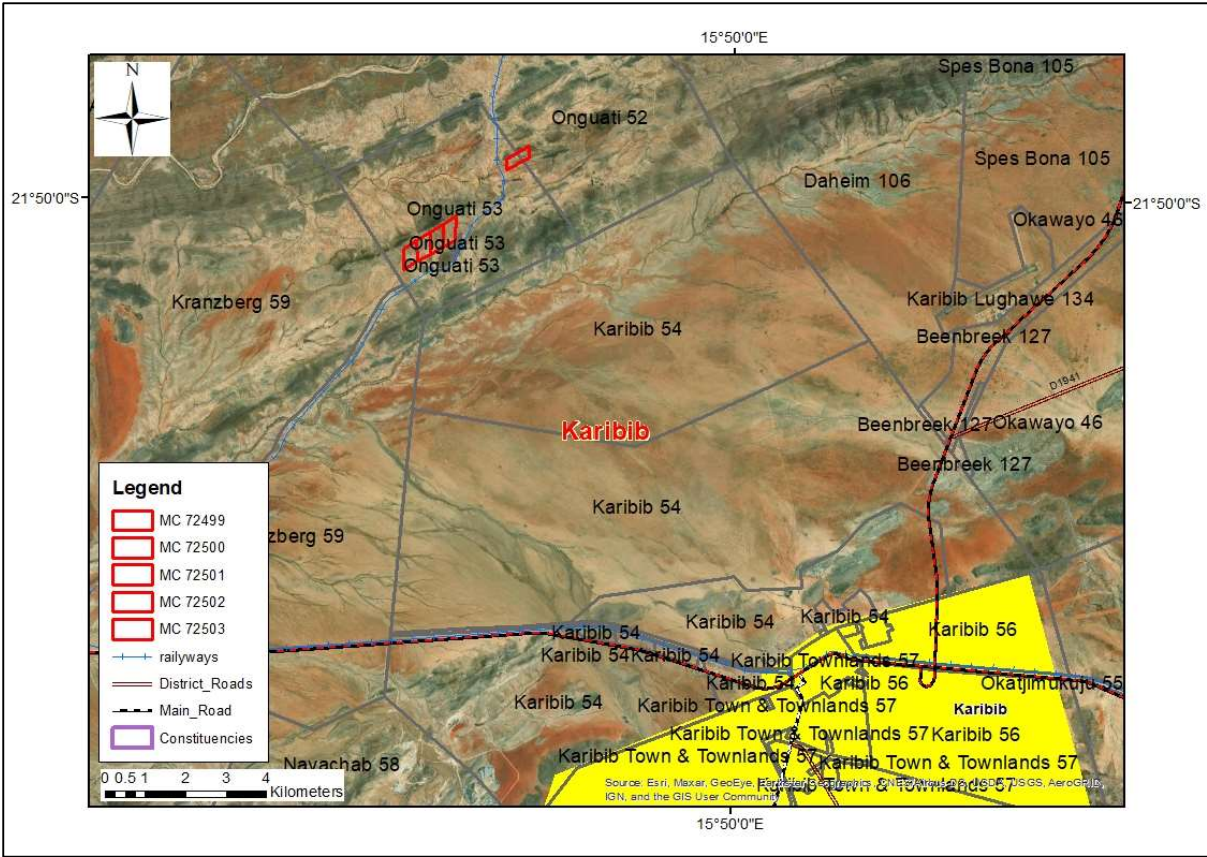


Figure 1-1: Locality map of MC 72499, 72500, 72501, 72502 and 72503 in the Erongo Region.

**Table 1-1: Approximate GPS Coordinates of MC 72499, 72500, 72501, 72502 and 72503.**

<b>Approximate Site coordinates:</b>	<b>Mining claim 72499:</b>		
	MC	Latitude	Longitude
	72499	-21.843864°	15.763772°
		-21.838992°	15.763575°
		-21.837500°	15.766389°
		-21.842500°	15.766389°
	<b>Mining claim 72500:</b>		
	72500	-21.845528°	15.760586°
		-21.840578°	15.760561°
		-21.838992°	15.763575°
		-21.843864°	15.763772°
	<b>Mining claim 72501:</b>		
	72501	-21.821389°	15.784167°
		-21.823889°	15.784167°
		-21.826667°	15.778611°
		-21.824167°	15.778611°
	<b>Mining claim 72502:</b>		
	72502	-21.849075°	15.754231°
		-21.844483°	15.754208°
		-21.842619°	15.757219°
-21.847203°		15.757561°	
<b>Mining claim 72503:</b>			
72503	-21.847203°	15.757561°	
	-21.842619°	15.757219°	
	-21.840578°	15.760561°	
	-21.845528°	15.760586°	

### **1.3 Mining Claims Ownership and Land Tenure**

H. Honeb is the sole holder of the five (5) mining claims concerned, namely: 72499, 72500, 72501, 72502 and 72503. The license holder holds several other prospecting and mining rights and is adequately experienced in dimension stone quarrying.

## 1.4 Purpose of the Environmental Management Plan (EMP)

Regulation 8 of the Environmental Management Act's (EMA) (7 of 2007) Environmental Impact Assessment Regulations (2012) requires that a draft Environmental Management Plan (EMP) be included as part of the Environmental Assessment (EA) process. The "draft" has context in this regard to emphasize that the document (i.e., the EMP) remains a working document which is to be updated continuously during the operational phase of the project to account for variations in site specific environmental conditions, the technology and quarrying methods and technologies being used, and the market's demands as well as accommodate feedback or results from the recommended monitoring programs. A 'management plan' is defined as:

*"...a plan that describes how activities that may have significant environments effects on the environment are to be managed, mitigated, controlled and monitored."*

The EMP is a legally binding document to the project proponent and is one of the most important outputs of the EA process as it synthesises all the proposed mitigation and monitoring actions, set to a timeline and with specific assigned responsibilities. It provides a link between the impacts identified in the environmental assessment process and the required environmental management actions on the ground during project implementation and subsequent operations. It is important to note that the custodian person or entity who contravenes the provisions of this EMP may face imprisonment and/or a fine.

The purpose of this document is therefore to guide environmental management throughout the following phases of the proposed project:

- **Mine Preconstruction** - the period during which the project site is cleared, and the ground is prepared to pave way for the construction of support infrastructures such as the installation of containerized offices, workshops, access roads, waste rock stockpile bays, ablution facilities, a weigh bridge and quarry. This phase also includes geotechnical stability assessment to inform open pit design and human resource planning.
- **Mine Construction and Operations** – during this phase, the proposed quarrying and ongoing exploration activities will take place in a responsible manner for the production of marble dimension stone which will then be transported to processing plants in Karibib.
- **Decommissioning and rehabilitation** – the period after which the quarrying and ongoing exploration activities will cease and the area is to be rehabilitated to restore the environment to acceptable or tolerable limits.



## **1.5 The Environmental Consultant**

OMAVI Geotechnical & Geo-environmental Consultants is a specialist environmental consulting entity, established in 2018. OMAVI has experience and a holistic know-how in biophysical and socio-economic impact assessments, state of the environment reporting, Waste Management Planning, Environmental Management and Rehabilitation Planning, Public Participation coordination, as well as the management and co-ordination of all aspects of the Environmental Impact Assessment (EIA) process.

OMAVI has been active in the above fields, and in so doing has made a positive contribution towards environmental management and sustainable development in Namibia. OMAVI's belief is that a balance between socio-economic development and environmental protection can be achieved through strategic planning, as well as transparent engagements between all parties involved in a project.

The Environmental Scoping Assessment (ESA) was conducted by a qualified and experienced environmental practitioner, whose detailed curriculum Vitae (CV's) is provided in Appendix B of this document.

## **1.6 Limitations of the Draft Environmental Management Plan (EMP)**

The following limitations apply to this EMP:

- This report has been compiled at a scoping level with baseline information obtained from field observations/ evaluation and local literature.
- OMAVI assumes that all the project technical information and data provided by the Proponent is correct and accurate and that all necessary information has been disclosed which led to the development of this EMP.
- It is also assumed that the relevant information obtained from different local literature consulted is accurate, and
- This EMP has been compiled on an assumption that there will be no significant changes to the proposed project activities or the affected biophysical and social environment between the time of compiling this EMP and implementation of the proposed project that could substantially alter the baseline information and planned impact enhancement or mitigation measures

## **2 BRIEF PROJECT DESCRIPTION, ACTIVITIES AND PROCESSES**

The proponent intends to undertake small to medium scale quarrying (mining) and ongoing exploration for the production of marble dimension stone on mining claims 72499, 72500, 72501, 72502 and 72503 in the Karibib Constituency, Erongo Region. The mining of dimension stone will predominantly consist of extraction of 5m<sup>3</sup> size marble blocks, sorting, storage and transportation to processing plants in Karibib.

The proposed project broadly entails three (3) stages, namely: mine preconstruction phase, mine construction and operations, and the decommissioning phase. These project stages and desired properties are stated hereunder.

### **2.1 Desired Properties, Application and Uses**

Dimension stone is generally defined as natural rock quarried for the purpose of cutting and(or) shaping to a specific size (Barton, 1968; Dolley, 2004). It is one of the oldest and most durable building materials. It is used for its beauty in architecture and sculpture, tabletops, kitchen tops, floor and wall tiles. The main qualities of dimension stone that determine its popularity and use include its color, patterns and texture, its durability and the consistency of supply. Different markets demand different quality characteristics.

### **2.2 Mine Preconstruction**

Mine preconstruction involves the initial planning stages of a mining project. This consists of the Proponent working closely with its design and construction team to develop detailed drawings, schedules, budgets and manpower projections before quarrying starts. A thorough and deliberate pre-construction process is extremely important to ensure the quarrying project goes as planned and all potential needs are identified and addressed. The following activities are to be conducted as part of the preconstruction stage for the proposed quarrying (mining workings) and ongoing exploration on mining claims 72499, 72500, 72501, 72502 and 72503:

- Clearing, stripping, grubbing and topsoil removal of the selected quarry areas, office blocks, waste rock stockpiles and supporting infrastructure.
- Geotechnical Stability Assessment to inform Open pit design.
- Engineering design of support infrastructure including water, storage areas, workshops and containerized administration blocks.
- Creation of access roads and widening of existing tracks.
- Human resources planning, development of community and social programs and environmental and social management programs.
- Topsoil Management.
- Development of temporary construction camp,

- Installation of containerized offices, workshops, storage facilities.

All solid waste shall be disposed of the the Karibib Muncal waste facility. All liquid waste shall be managed through a French Drain System or chemical toilets approved by the Department of Water Affairs in the Ministry of Agriculture, Water and Forestry (MAWLR).

## **2.3 Mine Construction and Operations**

### **2.3.1 Mine Design and Construction**

Open pit quarrying will be adopted using diesel powered equipment, load and haul operation. As part of the project inputs the following equipment and resources will be required:

#### **Vehicles, Machinery and Equipment**

- Front end loaders, excavators, articulated dump trucks (ADT's), bull dozers and operators for:
  - creation of access roads,
  - surface clearing at quarrying sites, and
  - stockpiling of topsoil
- Rotary core/ RC Drill rig for ongoing exploration. The following support resources will be required:
  - drill operators
  - drill assistants
  - 4x4 bakkie
- Blade and diamond saw cutting equipment and operators to cut out marble blocks.
- Water bowsers and an operator/ driver.
- Diesel engine powered generators to supply power.
- Air compressors to be used for air blowing.
- Two-way radios for communication between various operators.
- ADT's and Long distance haulage trucks for onsite and offsite transportation of waste rock and blocks.

#### **Water Resources**

- Water for quarrying operations will be sourced from boreholes in the area and will then be carted to active quarry sites. The anticipated water requirement during full quarry operations will be approximately 10 000 L per week.

#### **Power sources**

- Power supply for air compressors and cutting equipment will be by means of a high-capacity mobile diesel engine powered generator.

### **Health and Safety**

- All workers will be provided with personal protective equipment (PPE) in the form of ear plugs, safety glasses, hard hats, safety boots, safety harness (where necessary), goggles and protective gloves. First aid kits will be made readily available on site to attend to any minor injuries. Major injuries shall be attended to at the Karibib clinic.

### **Fire management**

- Provision of fire extinguishers will be made available in vehicles and work sites.

### **2.3.2 Mine Operations (Extracting the Marble)**

In the quarrying of dimension stone it is necessary to split or cut the stone into successively smaller pieces until the final desired block size is achieved, and saleable blocks are produced. The size of individual block produced depends on a number of factors, including the homogeneity of the rock itself, the ability of the quarry operator to handle the rough stone, and the required end use for the stone once it has been shaped. The mining methods utilised in the extraction of dimension stone range from relatively simple and low technology methods to some quite technologically advanced methods.

Sawing with diamond wire is the main method of primary and secondary cutting as well as block squaring in marble quarries today. This method is the preferred method to be adopted by The Proponent for the proposed small to medium scale marble quarry project.

### **2.3.3 Stone Handling and Transportation**

Depending on the pit design and quarry geometry, handling of blocks is either by means of gantry cranes or front-end loaders. For the proposed project and scale of operation, front end loaders will be utilized. These machines are commonly fitted with a quick coupler attachment, which allows for fast interchanging of the bucket with a fork or boom attachment, while the bucket is generally used for handling waste material and for cleaning up the quarry. The fork attachment is used for handling of blocks, and the boom for pulling block down from the face.

Hydraulic 30-ton class excavators will be used during the removal of overburden, as well as within the quarry itself to pull or push split blocks off the face. Transport of waste material to the waste dump stockpile areas will be accomplished by means of front-end loader and articulated dump trucks (ADTs).

## **2.4 Rehabilitation**

It is stated in the National Policy on the Prospecting and Mining of mineral resources that organizations involved in prospecting and mining should take responsibility for performing adequate rehabilitation and restoration, during and upon closure of their activities. Reclamation and rehabilitation shall be implemented progressively during quarrying and exploration by means of the following measures:

- Cleaning up all sites and spreading topsoil at every exploration drill site, post drilling and quarrying.
- Backfilling all quarry sites where results are not positive.
- Sealing all boreholes where continuous quarrying is unlikely to happen.

## **3 EMP IMPLEMENTATION AND RESPONSIBILITIES**

The EMP has identified the Project Site Manager; Safety, Health and Environment (SHE) Officer and Public Relation Officer (PRO) as important roles to implement the environmental management plan for the proposed activities. It should be noted that in practice, however, these roles may be assigned to and performed by one person, especially for small to medium scale projects such as this one.

The roles and responsibilities of all parties involved in effectively managing the environment are set out below:

### **3.1 The Project Site Manager (or the Proponent)**

The duties of the Project Site Manager or his nominated authority are as follows:

- Managing/overseeing the implementation of this EMP and ensuring that the EMP is updated regularly as more or new data and information is collected.
- Issuing fines to or formally disciplining individuals who contravene EMP provisions and if necessary, removing such individuals from site completely.
- Setting up and managing the schedule for the day-to-day activities; taking into account that daily safety briefs are held.
- Liaison with all relevant interested and affected parties/stakeholders.
- Ensuring all incidents are recorded, documented and reported to the relevant authorities.
- Undertaking an annual review of the EMP and amending the document when necessary.
- Ensuring that all permits required for the operation are obtained timeously and are available on site at all times. Such permits include the ECC, the water abstraction certificate, Oil storage certificate, etc.

### **3.2 Safety, Health and Environmental (SHE) Officer**

The SHE Officer will be responsible for the following activities:

- Planning, conducting and signing off site inductions to the workers on-site and visitors to the worksite(s).
- Developing area-specific reference safety, health and environmental manuals for all work sites, as well as quick SHE checklists that workers and visitors/ contractors may use for quick specific job risk assessments.
- Recording all SHE related incidences on site.
- Ensure availability of all PPE on site.
- Ensuring that the requirements of the EMP are carried out during applicable activities throughout the project life span.
- Continuously implement the monitoring programs outlined in the EMP.

### **3.3 Public Relation Officer (PRO)**

The Public Relation Officer will be responsible for the following tasks:

- Liaising between the affected farmers (property owners) and/or occupiers of land and the Proponent.
- Ensure effective communication with stakeholders (affected farmers or landowners or occupiers of land), media (if necessary) and the public.
- Managing public relations and dispute issues.
- Preparing and submitting public relations reports, if required.
- Collaborating with personnel and maintaining project-related open communication among personnel.

## **4 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN ACTIONS**

This chapter presents a list of legal requirements in terms of permitting and licensing for certain project activities, followed by documentation of impact enhancement and mitigation measures (management plan actions) related to this project.

The aim of the management plan actions laid provided in the Tables below is to enhance potential benefits and avoid potential impacts where possible. Where impacts cannot be avoided, measures are provided to reduce or manage the significance of these impacts.

These management plan actions are a "translation" of mitigation measures recommended to manage the potential impacts identified in the project's Environmental Scoping Report.

## 4.1 Applicable Legislation: Authorisation (Permits and Licenses)

The legal obligations (legislations, policies, and guidelines) that governs certain project activities are detailed in this section. This involves matters where permitting and/or licensing may be required from different applicable regulatory authorities. **Error! Reference source not found.** below provides a list of applicable legislation in terms of permitting or licensing requirements for the proposed activities. The full list and description of the legal framework (where permits are required or not) is presented in the Scoping Report.

**Table 4-1: Applicable legislations in terms of permitting or licensing requirements for the proposed activities.**

Legislation	Relevance to Project	Contact Details for obtaining Permits
Environmental Management Act 2007 Environmental Impact Assessment (EIA) Regulations (EIAR) (GG No. 4878)	Activities listed in Government Notice (GN) No. 29 of GG No. 4878 require an Environmental Clearance Certificate (ECC). The amendment, transfer, or renewal of the ECC (EMA S39-42; EIAR Regs19 & 20). Amendments to this EMP will require an amendment to the terms and conditions of the ECC. <b><u>The ECC needs to be renewed every 3 years.</u></b>	<b>Mr Damian Nchindo (Ministry of Environment, Forestry and Tourism's Department of Environmental Affairs and Forestry (DEAF) – Chief Conservation Scientist)</b> <b>Tel: (061) 284 2701</b>
The Water Act 54 of 1956 The Water Resources Management Act No. 11 of 2013 (unpromulgated)	The Water Act 54 of 1956 was formulated to consolidate and amend the laws relating to the control, conservation and use of water for domestic, agricultural, urban and industrial purposes; to make provision for the control, in certain respects, of the use of sea water for certain purposes; for the control of certain activities on or in water in certain areas. <b>Provision for a Groundwater abstraction and use permit for commercial use to be applied for and obtained from the Department of Water Affairs (DWA): Directorate of Water Resources Management. When issued to the Proponent, the permit should be renewed as required (as stipulated therein).</b>	<b>Mr Franciskus Witbooi (Deputy Director: Water Policy and Water Law Administration).</b> <b>Tel: (061) 208 7158</b>
Mineral Prospecting & Mining Act (Act No. 33 of 1992)	Section 38 (1): Applications for renewal of registration of mining claims. The Proponent should ensure that all the necessary permits/authorisation for activities performed on the mining claims are obtained from the Ministry of Mines & Energy (MME)'s Mine Directorate. Section 54(2): details provisions pertaining to the decommissioning or abandonment of a mine / explored sites because of related activities.	<b>Mr Erasmus Shivolo (Mining Commissioner)</b> <b>Tel: 061 284 8167</b> <b>E: <a href="mailto:Erasmus.Shivolo@mme.gov.na">Erasmus.Shivolo@mme.gov.na</a></b>

Legislation	Relevance to Project	Contact Details for obtaining Permits
	<p>Under this Act (Section 51 (1a)), holder of a mineral license cannot exercise any rights on a private land until the holder has entered into an agreement with the owner regarding payment of compensation.</p> <p><b>The Mining Claim must be renewed with MME every 3 years</b></p>	<p><b><u>The Proponent should on time enter into and sign access and land use agreement (consent) with respective affected farm owners or representatives of the occupiers of land.</u></b></p>
Local Authorities Act No 23 of 1992	The Karibib Town Council is the responsible Local Authority of the affected project site area, and therefore they should be consulted in compliance with the Act and its Regulations, as relevant to the proposed project. Additionally, regulations specific to the Karibib Town Council shall be adhered to.	<p><b>Contact Person Mr. Lesley Grand Goreseb (The CEO)</b>  <b>Tel: 064 550 016</b>  <i>With all official correspondence addressed to the office of the Chief Executive Officer (P. o. Box 19 Karibib)</i></p>
Road Traffic and Transport Act 52 of 1999 and its 2001 Regulations	<p>Provides for the control of traffic on public roads and the regulations pertaining to road transport, including the licensing of vehicles and drivers.</p> <p><b>A site access road permit from the main road (B2) should be applied for and obtained from the Roads Authority and conditions set therein to be compiled with.</b></p>	<p><b>Mr Elina Lumbu (Roads Authority – Specialist Road Legislation)</b>  <b>Tel.: (061) 284 7027</b></p>
Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)	<p>Regulation 3(2)(b) states that "No person shall possess or store any fuel except under authority of a licence or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 litres or less in any container kept at a place outside a local authority area".</p> <p>If there is fuel stored or is intended to be stored on site, the relevant petroleum products storage licenses/permits should be applied for from the Petroleum Affairs at the Ministry of Mines and Energy</p>	<p><b>Carlo McLeod (Ministry of Mines and Energy: Acting Director – Petroleum Affairs)</b>  <b>Tel.: (061) 284 8291</b>  <b>E: <a href="mailto:Carlo.McLeod@mme.gov.na">Carlo.McLeod@mme.gov.na</a></b></p> <p>OR</p> <p><b>Mr. Tupa Iyambo (Chief Petroleum Inspector)</b>  <b>Tel: 061 284 8300</b>  <b>Email: <a href="mailto:Tupa.Iyambo@mme.gov.na">Tupa.Iyambo@mme.gov.na</a></b></p>
Forestry Act (No. 12 of 2001)	Permits are required for the removal of protected plants species.	<p><b>The nearest Forestry Office (Ministry of Environment, Forestry and Tourism) or Environmental Health Department at the Karibib Town Council</b></p> <p><b>Mr. R. Ashiyana</b>  <b>Tel: 064 550 016 or 081 398 7777</b></p> <p><b>Mr Joseph Hailwa (Director: Forestry), Tel: (061) 208 7663</b></p>
Nature Conservation Ordinance No. 4 of 1975 (as amended)	Permits are required for the removal of protected plants species.	
National Heritage Act (Act No. 27 of 2004)	The Act makes provision for the protection and conservation of places and objects of heritage significance and the registration of such places	<p><b>Mrs. Erica Ndalikokule (Acting Director) – National Heritage</b></p>



Legislation	Relevance to Project	Contact Details for obtaining Permits
	<p>and objects. Part V Section 46 of the Act prohibits removal, damage, alteration or excavation of heritage sites or remains, while Section 48 sets out the procedure for application and granting of permits such as might be required in the event of damage to a protected site occurring as an inevitable result of development. Part VI Section 55 Paragraphs 3 and 4 require that any person who discovers an archaeological site should notify the National Heritage Council. Section 51 (3) sets out the requirements for impact assessment.</p> <p>Should any objects of heritage significance be identified during the site clearing and or quarrying work, the work must cease immediately in the affected sites and <b>the necessary steps taken to seek authorisation from the Council.</b></p>	<p><b>Council of Namibia</b>  <b>Tel:(061) 301 903</b></p>
<p>Labour Act 11 of 2007 Health and Safety Regulations (HSR) GN 156/1997 (GG 1617).</p>	<p>Adhere to all applicable provisions of the Labour Act and the Health and Safety regulations in terms of employee benefits, occupational health and safety, dispute resolution measures, etc.</p>	<p><b>No permit is required, but adherence to the Act's Relevant Regulations is highly recommended to prevent labour protests and legal actions related to labour issues.</b></p>
<p>Waste Management Regulations of Karibib Town Council</p>	<p>The Proponents should familiarize themselves with the Karibib Town Council Regulations with regards to managing waste (both solid and liquid) on the project sites and where to dispose it.</p> <p>This will also entail the process to apply for permission to dispose of waste at the Karibib Municipal landfill/waste sites within the municipality's boundaries.</p>	<p><b>Mr. R. Ashiyana (Environmental Health Department)</b>  <b>Tel: 064 550 016 or 081 398 7777</b></p> <p>With all official correspondence addressed to the office of the Chief Executive Officer (P. O. Box 19 Karibib)</p>
<p><b>Health and safety:</b> Public Health Act (No. 36 of 1919)</p>	<p>Section 119 states that "no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health." This therefore requires the proponent to ensure that any possible nuisance in the form of noise, dust levels, visual impacts are limited to acceptable levels as provided for under the relevant regulations of this Act</p>	<p>The Proponents and all its employees should ensure compliance with the provisions of these legal instruments.</p> <p><b>No permit or license required, but adherence to the Act's Relevant Regulations is highly recommended.</b></p>

## 4.2 Impact Enhancement/ Mitigation Actions and Monitoring

The management plan actions for the enhancement of positive impacts and mitigation of negative impacts are presented in **Error! Reference source not found.** below. Since there is quite an overlap in terms of impacts between the various phases of the project, the impacts have not been separated per phase of the project. Table 4-2 contains the following aspects:

- Environmental aspect and issues for which management actions are required.
- Proposed impact enhancement/ mitigation measures.
- Key performance indicators for monitoring success levels of management actions.
- Responsible person(s) for implementing the proposed management actions.
- Resources required for implementing management actions and monitoring and.
- Implementation timeframes for the proposed management actions.

**Table 4-2: Management Plan Actions for the Development, Operational, and Decommissioning Phases**

Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party
<b>ADVERSE IMPACTS</b>				
Slope Instability	-Slope instability in quarry after heavy rains	-Monthly site inspections by a geotechnical engineer to assess stability of quarry slopes or walls, and recommend stabilization measures where necessary	-Presence, frequency of fractures and jointing  -General condition of quarry walls (is there evidence rockfall, slumping, loose rocks at base on slope, over-hanging rocks)	-Project Site Manager (holds overall responsibility)  -Geotechnical Engineer/ Geotechnical Consultant
Soils	-Destruction of soil structure through clearing, stripping, grubbing, topsoil removal, and compaction works  -Soil Erosion  -Soil Contamination and Pollution	- Stockpiles shall be located in areas away from drainage lines or windy areas in order to minimize the risk of soil and wind erosion.  -Use subsoils to backfill worked areas, and place fertile topsoil on top  - Re-spreading on the contour will aid runoff control and increase moisture retention for subsequent plant growth.  -Minimize disturbed footprint as much as practically possible by utilizing disturbed areas on site.  -Haul roads must have compacted drainage channels along shoulders covered with riprap (or possibly concrete lined) to minimize erosion  -Avoid creation of new tracks to minimize soil compaction as much as possible. All traffic	-Record any evidence of new traffic tracks outside of designated access and haul roads by means of photographs.  -Record evidence of new erosion gullies (photographs).  -Record evidence of soil contamination  -Annual site wide evaluation on the effectiveness of erosion control efforts including	-Health and Safety Officer  -Hired Soil Scientist

**January 2022**

Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources	Timeframe of management action(s)
		<p>should stick to access roads provided and or meant for the project operations</p> <p>- Topsoil will be re-spread in the reverse sequence to its removal, so that the organic layer, containing any seed or vegetation, is returned to the surface.</p> <p>-Scoop up polluted soils and transport them to designated landfills in Karibib.</p> <p>-Enforce punishment for non-compliance in the form of disciplinary hearing</p> <p>-Soil conservation training to staff</p>	<p>erosion control structures</p> <p>- Monitor depth of soil profile and contamination levels every 6 months in areas on runoff</p>			
Land Use	-Changes in land use due to ongoing exploration, erection of site infrastructure and creation of open pit from quarrying.	<p>-Compensate affected farmers for lost agricultural land</p> <p>-Fence off access roads and open pit from quarrying to minimize risk of vehicle-animal collisions</p>	<p>-Affected farmers effectively compensated</p> <p>-Sites fenced off</p>	-Project Site Manager (holds overall responsibility)	<p>-Funds or Equity to compensate affected farmers and acquire fencing material</p> <p>-Labour force to fence off sites</p>	<p>-Compensation can be once off or throughout the life of mine.</p> <p>-Fencing to be completed during site development and prior to production</p>
Topography and Landscape	-Changes in topography and landscape	<p>- Encourage quarrying activities on disturbed areas on the site.</p> <p>-Backfill open pit areas created by quarrying of blocks to create a slope as close as possible to the natural surrounding areas</p>	<p>-Annual site wide evaluation on the effectiveness of rehabilitation of open pits, waste rock stockpiles areas; and the spatial extent of</p>	-Project Site Manager (holds overall responsibility)	<p>-Fund for ongoing site rehabilitation</p> <p>-Earthmoving plant to backfill worked areas in quarry; spread topsoil over</p>	-Ongoing throughout the life mine.

Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources	Timeframe of management action(s)
		<p>-Minimize disturbed footprint at any given time by limiting cleared site to that which is to be mined in the next 6 months</p> <p>-Have designated stockpile areas</p> <p>-Maintain one access road to and from the quarry and site infrastructure.</p>	cleared ground at the quarry.		worked out areas; and grade rehabilitated areas to acceptable slopes	
Vegetation	<p>-Removal of vegetation during site clearing and quarrying.</p> <p>-Destruction of vegetation/ habitats by veld fires, excessive dust and illegal firewood collection</p>	<p>-Minimize disturbed footprint as much as practically possible at any given time by utilizing disturbed areas surrounding the site.</p> <p>-Before clearing each site hire an independent botanist to inspect the area for any protected plant species. If any identified, obtain removal permits from the Directorate of Forestry</p> <p>-Restrict movement of vehicle and machinery to existing roads and tracks to prevent unnecessary damage to vegetation</p> <p>-No onsite vegetation should cut or used for firewood related to the project's operations. The Proponent should provide firewood for onsite camping workers from authorized</p>	<p>-Keep record of names of all protected plant species identified by independent botanist prior to clearing any site</p> <p>-Monitor the following parameters for all rehabilitated areas: % vegetative cover; vertical structure of vegetation; plant health; richness and abundance of indicator species; type and extent of erosion; presence and extent of invasive alien plants</p>	<p>-Project Site Manager (holds overall responsibility)</p> <p>-Safety Health and Environmental Officer</p>	<p>-Funds for flora restoration program</p> <p>-Technical Consultants to help with monitoring restoration progress</p>	-Ongoing throughout life of mine.

Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources	Timeframe of management action(s)
		<p>firewood producer or sellers</p> <p>-Draft a restoration plan</p> <p>-Encroacher bush cut during site development may be stockpiled and sold to local charcoal producers</p>	<p>-Record all illegal activities related to destruction of vegetation such as illegal cutting of trees</p>			
Waste Management	<p>-Solid waste pollution due to littering and storage of domestic and industrial (explosives, scrap metal, empty containers, conveyor belts, used tyres) waste on site</p> <p>-Solid waste pollution due to stockpiling of waste rock, cleared vegetation</p> <p>-Waste pollution due to usage and storage of reagents, fuels and lubricants on site</p>	<p>-A site specific Solid Waste Management procedure should be drafted during site development and updated as the site developed and as quarrying progresses</p> <p>-A record of all waste generated and disposed from site is to be kept on site</p> <p>-All industrial solid waste should be disposed of at the Karibib Landfill / Waste Management Facility. The necessary permits should be obtained from the Karibib Town Council. All industrial waste should be stored in secure fenced off areas</p> <p>-Used tyres may be painted and used to mark the edges of roads, bends and accidental blind spots</p> <p>-Waste separation at source will be enforced by availing clearly labelled or differently coloured general waste (paper, plastic,</p>	<p>-Site wide evaluation of the general condition of all waste storage sites must be conducted as part of the bi-annual environmental audits</p> <p>-A register of all waste generated on site is kept on site</p> <p>-All waste disposal permits from relevant authorities are available on site</p>	-Safety Health and Environmental Officer	<p>-Funds to acquire waste storage bins/ drums; and transport all waste from the site</p> <p>-Funds to hire an independent environmental consultant to conduct bi-annual environmental audits</p>	Ongoing throughout the life of mine.

Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources	Timeframe of management action(s)
		<p>organic waste) rubbish bins at all working areas. These must be emptied weekly at the nearest registered waste dumping site</p> <p>-All hazardous waste such as oil drums and grease should be stored in secure fenced off and overhead covered areas. Such areas must also have a concrete floor for spillage containment purposes. Used oils and grease must sold to recycling companies</p> <p>-Waste rock stockpile areas to be located away from runoff pathways, and must be subsequently used as backfill in the quarry</p>				
Indigenous Fauna	<p>-Forced migration of fauna due to physical disturbance/ destruction of habitats, increased noise levels and increased dust in the are</p> <p>-Impended free movement of fauna due to physical obstructions (fences, quarry, etc)</p>	<p>-Minimize impact on animal migration by having culverts below roads</p> <p>-Minimize animal fatalities from collisions with vehicles by fencing off access and haul roads as well as open pits.</p> <p>-Site personnel shall refrain from killing/poaching or snaring or intentionally disturbing local animals that may be found on and around the working areas.</p> <p>-All wild animals found to be causing trouble at the working areas are to be reported to the relevant directorate at the MEFT, and shall only be removed from site by authorized personnel from such directorates</p>	<p>-Keep records of all illegal hunting activities; vehicle-animal collision incidences; animal poisoning through consumption of hazardous substances</p> <p>-Conduct animal counts at the quarry sites every 6 months as part of the bi-annual environmental audit</p>	-Safety Health and Environmental Officer	-Funds to hire an independent environmental consultant to conduct bi-annual environmental audits	Ongoing throughout the life of mine.

Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources	Timeframe of management action(s)
	-Threats from illegal hunting and possible poaching					
Air Quality	-Dust generated from extraction of the marble, bulk excavations, movement of traffic, equipment and haul/ access roads	<ul style="list-style-type: none"> <li>-Apply a 150mm layer of 37.5mm aggregates as cover on access and haul roads to minimize generation of dust</li> <li>-Locate stockpiles in the predominant wind direction</li> <li>- Cover earthmoving equipment carrying dusty materials to prevent materials being blown from the vehicles</li> <li>-Set speed limits (35km/h) to minimize the creation of fugitive dust within the project boundary</li> <li>-Limit vehicle idling and keep vehicles well maintained to minimize particulate and gaseous emissions</li> <li>-Where practical, plant trees and vegetation outside the quarry limits to minimize spreading of dust to surroundings</li> <li>-The production drill rig to be used must be fitted with dust capture equipment</li> <li>-Reduction in unnecessary traffic volumes;</li> <li>-Use of wet suppression during drilling</li> <li>-All personnel onsite to wear appropriate PPE</li> </ul>	<ul style="list-style-type: none"> <li>-Monthly dust level monitoring by installing dust buckets down-wind from the quarry</li> <li>-Continuous monitoring for ambient dust/ particulate (PM10 and PM2.5)</li> <li>-All employees must do a mandatory health check every 6 months to monitor impact on their respiratory systems</li> </ul>	-Safety Health and Environmental Officer	<ul style="list-style-type: none"> <li>-Funds to implement the dust and air quality monitoring program, including the bi-annual personnel health checks</li> <li>-Technical Specialists (Air quality)</li> </ul>	Ongoing throughout the life of mine.



Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources	Timeframe of management action(s)
Noise and Ground Vibrations	<p>-Increased nuisance due to increased noise and ground vibrations from ongoing exploration activities and marble quarrying</p> <p>-Increased nuisance due to increased noise and ground vibrations from diamond and blade saw cutting</p>	<p>- During mine design and construction, when the intensity of works is anticipated to be variable, monthly noise surveys will be undertaken at the receptors closest to the active work areas. Each receptor will be monitored for a period not less than 24 hours and the results compared with the threshold values stipulated under the relevant SABS standard</p> <p>- During the mine operations phases, when noise levels are anticipated to be less variable, the frequency of monitoring will be reduced to annual surveys, with spot-checks of 1 hour's duration during the daytime and night-time at receptors conducted monthly. Additional 24-hour surveys will be conducted should noise complaints be received</p> <p>-Vibration surveys will be completed in accordance with the method set out in the British Standard BS 5228. The frequency of the surveys will be determined by the quarrying schedule, and receptors will be installed at or closest to permanent structures in the area</p>	- Measured levels will be recorded in a log and checked for compliance with the evaluation criteria stipulated under appropriate standards such as SABS or BS 5228	-Safety Health and Environmental Officer	<p>-Funds to implement the noise and vibration monitoring program, including purchasing of simple equipment</p> <p>-Technical Specialists (noise and ground vibrations)</p>	Ongoing throughout the life of mine.

Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources	Timeframe of management action(s)
		<p>-Project employees will be trained to operate a sound level meter and how to undertake reliable environmental noise measurements.</p> <p>-A communications plan will be enacted to communicate the results of the monitoring to nearby residents and to record and investigate any noise complaints.</p> <p>-Monitor ground vibration at sensitive receptors and evaluating any impact on structures should they occur</p>				
Surface Water Resources	-Pollution of surface water resources through hydrocarbon spillages in runoff areas and contamination of small streams in the area as a result of inadequate sanitation facilities resulting in reduced water quality	<p>- Install and maintain efficient oil and grease traps or sumps at refuelling above-ground fuel storage tank, workshops, and containment areas, and making spill kits available with emergency response plans</p> <p>-Attenuate surface runoff by using on-site storage and water management infrastructure (e.g. storage sumps, low gradient ditches, clean water diversion ditches)</p>	-Implement monthly surface water quality monitoring.	-Safety Health and Environmental Officer	<p>-Funds to implement the monitoring program</p> <p>-Technical Specialists (Water Specialist)</p>	Ongoing throughout the life of mine.

Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources	Timeframe of management action(s)
		<ul style="list-style-type: none"> <li>-Construct and maintain containment facilities for hazardous materials</li> <li>-Install adequate portable toilets fitted with well-sealed septic tanks</li> <li>-Divert clean water from quarry and access/haul road sites through construction of gently sloping diversion ditches</li> </ul>				
Groundwater Resources and use	<ul style="list-style-type: none"> <li>-Pollution of groundwater resources</li> <li>-Abstraction may result in lowering of the water table on site</li> </ul>	<ul style="list-style-type: none"> <li>-The proponent must implement contamination mitigation measures as for surface water impacts, especially in the vicinity of the quarry and, oil storage tank</li> <li>-Seal off unused boreholes</li> <li>-Monitor groundwater levels in abstraction wells/ boreholes to assess potential effects of dewatering on groundwater levels as well as on borehole yield with time</li> </ul>	<ul style="list-style-type: none"> <li>-Implement monthly surface water quality monitoring. Target levels to comply with baseline water quality</li> <li>-Monitor flow rates by installing flow meters in boreholes</li> </ul>	-Safety Health and Environmental Officer	<ul style="list-style-type: none"> <li>-Funds to implement the monitoring program</li> <li>-Technical Specialists (Water Specialist)</li> </ul>	Ongoing throughout the life of mine.
Occupational Health and Safety	<ul style="list-style-type: none"> <li>-Short to Long-term safety effects</li> <li>-Short to Long-term health effects from dust and noise</li> </ul>	<ul style="list-style-type: none"> <li>-Proponent must avail adequate and appropriate PPE to all workers and visitors</li> <li>-Timeously recording and reporting of all health and safety incidences</li> </ul>	<ul style="list-style-type: none"> <li>-Regular health screening of workers</li> <li>-Bi-annual health and safety audits done</li> </ul>	<ul style="list-style-type: none"> <li>-Project Site Manager (holds overall responsibility)</li> <li>-Safety Health and Environmental Officer</li> </ul>	<ul style="list-style-type: none"> <li>-Funds to acquire health and safety related equipment; and employee medical insurance</li> <li>-First Aid training for</li> </ul>	Ongoing throughout the life mine

Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources	Timeframe of management action(s)
		<ul style="list-style-type: none"> <li>-Develop an MOU with the Local Healthcare Centres in Karibib for service provision to the local workforce</li> <li>-Enforcement of speed limits and sanctions for any personnel found in violation of speed limits, including senior staff and contractors' and sub-contractors' employees</li> <li>-Appropriate signalling of moving heavy machinery</li> <li>-All drivers to be given safety education focussing on speed and conflicts between pedestrians and animals</li> <li>-Proper screening of appointed security personnel to ensure they were not implicated in human rights abuses in the past</li> </ul>			at least 2 personnel at each work site	
Farm Security	-Security threats to farmers due to increased/ ease farm access	<ul style="list-style-type: none"> <li>-Appoint a security company to safeguard entrance to the site as well as in and around the mining claims</li> <li>-Install flood lights at the quarrying areas and site infrastructure to facilitate visibility during the night</li> </ul>	-Record and report (timeously) all theft, injury related incidences	-Project Site Manager (holds overall responsibility)	-Funds to procure security services	Ongoing throughout the life of mine.

Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources	Timeframe of management action(s)
Visual Damage	<ul style="list-style-type: none"> <li>-Visual impact due to lighting at night</li> <li>-Visual impact from B2 road as a result of visible open pits and support infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>-installation of rock blinding in open pit areas.</li> <li>-Maintain floods lights switched on at night at the quarry site at all times</li> </ul>	-	-Site Foreman	-	-
Heritage/ Archaeology	-Possible destruction of unforeseen heritage/ archaeological sites	<ul style="list-style-type: none"> <li>-Prior to excavating stripping and grubbing, and extraction of blocks, conduct a visual inspection of the site for any features of archaeological/ heritage/ religious importance. This must be done by a competent person trained in heritage resource identification</li> <li>-Apply the chance find procedure documented above</li> </ul>	-Records of all archaeological/ heritage/ religious sites or features identified	-Project Site Manager (holds overall responsibility)	-Technical Specialists (Historian/ Archaeologist)	Ongoing throughout the life of mine
Public Disputes/ Grievances	-Risk of compromised relationships between Project owner and farm owner	<ul style="list-style-type: none"> <li>-Have a complaints logbook.</li> <li>- Monitor community grievances and provide feedback</li> </ul>	Monitor community grievances and provide feedback	-Project Site Manager (holds overall responsibility)	-	Ongoing throughout the life of mine
<b>POSITIVE IMPACTS</b>						

Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources	Timeframe of management action(s)
Employment and technical skills transfer	<ul style="list-style-type: none"> <li>-Employment opportunities for youth from Karibib Constituency.</li> <li>-Transfer of technical skills</li> </ul>	<ul style="list-style-type: none"> <li>-Regular and accessible (transparent) dissemination of the human resources and employment policy to interested and affected communities</li> <li>-Complaints of inequality and discrimination in job selection and in jobs</li> <li>-Ensure that every job occupied by a foreign national has a local under-study to ensure on the job training of the under-study</li> </ul>	<ul style="list-style-type: none"> <li>-For every key job occupied by a foreign national evaluate skills learned by local under-study at the end of each financial year</li> </ul>	<ul style="list-style-type: none"> <li>-Project Site Manager (holds overall responsibility)</li> <li>-Public Relations Officer</li> </ul>	<ul style="list-style-type: none"> <li>-On the job training resources</li> </ul>	Ongoing throughout the life of mine
Local Empowerment and Procurement Opportunities	<ul style="list-style-type: none"> <li>- Empowerment of Previously Disadvantaged Persons</li> <li>-Opportunities for local companies to procure support services such as cleaning, marketing, cooking, canteen services, and supply of spares</li> </ul>	<ul style="list-style-type: none"> <li>-Procure support services (cleaning, cooking, machinery maintenance, security and product transportation services from local previously disadvantaged contractors)</li> </ul>	<ul style="list-style-type: none"> <li>-Every 6 months review contracts awarded for support services to assess extent of local previously disadvantaged contractors</li> </ul>	<ul style="list-style-type: none"> <li>-Project Site Manager (holds overall responsibility)</li> <li>-Public Relations Officer</li> </ul>	-	Ongoing throughout the life of mine
Financial benefits to Landowner	<ul style="list-style-type: none"> <li>-Financial benefits to farm owner through surface lease fees</li> </ul>	<ul style="list-style-type: none"> <li>-Ensure affected landowners are reasonably compensated either in cash or through equities or through surface rentals</li> </ul>	<ul style="list-style-type: none"> <li>-Evaluate mode and magnitude of compensation during the bi-annual environmental audits</li> </ul>	<ul style="list-style-type: none"> <li>-Production Site Manager (holds overall responsibility)</li> </ul>	<ul style="list-style-type: none"> <li>-Funds for compensation</li> </ul>	Once off
Revenue for	<ul style="list-style-type: none"> <li>-Revenue collection</li> </ul>	<ul style="list-style-type: none"> <li>-The proponent must pay all relevant taxes</li> </ul>	<ul style="list-style-type: none"> <li>- Evaluate mode and</li> </ul>	<ul style="list-style-type: none"> <li>-Production Site</li> </ul>	-	Ongoing

Aspect	Impact	Mitigation / Enhancement Measure(s)	Key Performance Indicator (KPI)	Responsible Party	Resources	Timeframe of management action(s)
Government	for government through taxes and Mining Claim License levies	applicable under the constitution of the Republic of Namibia	magnitude of compensation during the bi-annual environmental audits	Manager (holds overall responsibility)		throughout the life of mine
EMP implementation and training	Lack of EMP awareness and implications thereof	An EMP non-compliance penalty system should be implemented on site.  The Proponent should appoint an SHE Officer to be responsible for managing the EMP implementation and monitoring.	All required Plans and systems are compiled and in place  Safety, Health and Environmental (SHE) Officer is appointed	Proponent	Records of EMP implementation Plans and Systems	Pre-quarrying (project activities)

### 4.3 Rehabilitation Measures After Site Closure

**Error! Reference source not found.** provides the rehabilitation and closure measures to be implemented at closure of the quarrying / mine workings and ongoing exploration to meet the requirements of the Environmental Management Act.

**Table 4-3: Rehabilitation Measures After Site Closure.**

ENVIRONMENTAL ASPECT	REHABILITATION ACTIONS	COMPLETION CRITERIA
Revegetation	<p>-All surface infrastructure areas affected by the project will be re-vegetated using local plant species. The following revegetation measures will be implemented over the disturbed site:</p> <p>Prepare surface rehabilitation areas for the natural establishment of vegetation by undertaking the following:</p> <ul style="list-style-type: none"> <li>• Rip disturbed footprint to a depth of approximately 300 mm with suitable earthmoving equipment to alleviate compaction.</li> <li>• For areas that are heavily compacted (hard stands, access roads, haul roads), rip with construction equipment to subgrade level, and over-excavate and additional 300mm in order to create suitable conditions for vegetation establishment; spread stockpiled topsoil, and ameliorate soils as required.</li> <li>• Allow for natural establishment of a viable self-sustaining vegetation community, in keeping with the surrounding natural environment, or establish pioneer vegetation species as per findings of dedicated rehabilitation trials to be run from the start of the project, and</li> <li>• Undertake vegetation monitoring (including % recovery of un-revegetated sites) post closure to ensure rehabilitation success</li> </ul>	<p>-Monitoring sites are established on site (1 every 10 ha) and surrounding sites (at least four representative control sites). Flora species diversity in rehabilitated areas are representative of control sites. Vegetation density of monitoring sites are at least 80% when compared to the average of the control sites.</p>
Contaminated Soils	<p>-Undertake a site-wide contaminated soil to determine the nature and extent of contamination, the sources of contamination and to identify appropriate remediation measures.</p> <p>-Rehabilitate moderately contaminated (inorganically contaminated) soils as follows:</p> <ul style="list-style-type: none"> <li>• Excavate and remove contaminated material to a depth of 300</li> </ul>	<p>-Inorganically contaminated soils are safely disposed of at the Karibib Waste Facilities, subject to granting of relevant permits</p> <p>-Organically contaminated soils are effectively treated and compositions are restored to acceptable levels once compared with control sites</p>



ENVIRONMENTAL ASPECT	REHABILITATION ACTIONS	COMPLETION CRITERIA
	<p>mm and dispose of at Karibib Landfill.</p> <p>- Rehabilitate moderately contaminated (organically contaminated) soils as follows:</p> <ul style="list-style-type: none"> <li>• Treat organic contamination by means of biological remediation via the establishment of a bioremediation site and monitor soil quality against a selected control site.</li> </ul>	
Surface Infrastructure and Equipment	<p><b><u>Infrastructure for Potential Beneficial re-use</u></b></p> <ul style="list-style-type: none"> <li>• Compile an inventory of infrastructure and equipment to potentially remain at closure, aligning to end land use plan.</li> <li>• Obtain legal authorisations from Karibib Town Council and Farm owner for infrastructure to remain and to be transferred, and</li> <li>• Finalise agreements with third parties, along with transfer schedule</li> </ul> <p><b><u>Surface infrastructure to be removed</u></b></p> <ul style="list-style-type: none"> <li>• Remove all assets/equipment that can be profitably removed for salvage or resale.</li> <li>• Dismantle/demolish infrastructure.</li> <li>• Decontaminate hazardous waste storage tanks and containers at a dedicated decontamination bay in Karibib.</li> <li>• Backfill excavations of disturbed infrastructure footprint areas through a cut to fill action.</li> <li>• Shape and profile the disturbed surface areas to match surrounding topography and to ensure free drainage, thus limiting run-off and erosion.</li> <li>• Stabilise disturbed areas to prevent erosion and sediment mobilisation in the short to medium term until a suitable vegetation cover has been established.</li> </ul>	<p>-Formal transfer of ownership and liability of specific infrastructure</p> <p>-Independent sign-off by a qualified engineer confirming the safe and stable condition of all transferred infrastructure</p> <p>-All other infrastructure decommissioned to ground level and removed from site</p>

ENVIRONMENTAL ASPECT	REHABILITATION ACTIONS	COMPLETION CRITERIA
	<ul style="list-style-type: none"> <li>• Rip disturbed footprint to a depth of approximately 300 mm with suitable earth moving equipment to alleviate compaction; and</li> <li>• Establish vegetation species that mimic the surrounding flora by collecting seed from pristine bush and shrub land and actively planting before the wet season</li> </ul> <p><b><u>Measures relating to support Infrastructure</u></b></p> <ul style="list-style-type: none"> <li>• Obtain legal authorisations for infrastructure to remain and to be transferred.</li> <li>• Identify and donate equipment to affected landowner that can be reused and/or recycled.</li> <li>• Dismantle overland pipelines and salvage where possible.</li> <li>• Seal open ends of buried pipelines and fully cover with nothing exposed.</li> </ul> <p><b><u>Measures relating to transport Infrastructure</u></b></p> <ul style="list-style-type: none"> <li>• Agreements will be put in place between The Proponent and as well as the relevant authorities for roads to remain post closure for beneficial use by the landowner.</li> <li>• Roads that will no longer be used by local community's post closure will be rehabilitated as follows: <ul style="list-style-type: none"> <li>○ Re-establish natural drainage, including the removal of culverts and/or trenching.</li> <li>○ Profile to be free draining and emulating the natural surface topography.</li> <li>○ Rip access roads to subgrade level with suitable earth moving equipment to alleviate compaction, and</li> <li>○ Establish vegetation species that mimic the surrounding shrub/ bushland by collecting seeds from pristine</li> </ul> </li> </ul>	

ENVIRONMENTAL ASPECT	REHABILITATION ACTIONS	COMPLETION CRITERIA
	<p>surroundings and actively planting before the wet season</p> <p><b><u>Measures relating to Electrical Infrastructure</u></b></p> <ul style="list-style-type: none"> <li>• Remove generators offsite and demolish concrete bases.</li> <li>• Dispose of demolition waste at demolition waste site.</li> <li>• Clean up contaminated soils at the generator site, as required</li> </ul> <p><b><u>Measures relating to Mobile Machinery/ Vehicles</u></b></p> <p><u>Machinery and Vehicles</u></p> <ul style="list-style-type: none"> <li>• Identify equipment that can be reused and/or recycled that will not be salvaged.</li> <li>• Remove remaining equipment offsite for sale or disposal at a registered waste site in Karibib; and</li> <li>• Clean-up contaminated soils</li> </ul>	
Open pits and diversion ditches	<ul style="list-style-type: none"> <li>• Place topsoil over the backfilled area.</li> <li>• Shape footprint area to be free-draining (aligned to site-wide routing).</li> <li>• Rip area to alleviate compaction, and</li> <li>• Establish vegetation</li> </ul>	
Surface and Groundwater	<p>Surface and groundwater monitoring must continue to be undertaken post closure to ensure that quarrying effluents meet the regulatory requirements. The following actions are to be undertaken:</p> <p><u>For Surface Water</u></p> <ul style="list-style-type: none"> <li>• Monthly monitoring of surface water sites for quality – for at least 5 years post closure or until site relinquishment criteria have been achieved; and</li> <li>• Conduct biomonitoring at selected downstream sites for at least</li> </ul>	<p>-Water samples taken from sampling points downstream of the quarry are within the National effluent quality specifications for a 12-month period</p> <p>- Water samples taken from representative groundwater monitoring boreholes are within the National effluent quality guidelines for a 12-month period</p>

ENVIRONMENTAL ASPECT	REHABILITATION ACTIONS	COMPLETION CRITERIA
	<p>5 years or until site relinquishment criteria have been achieved.</p> <p><u>For Groundwater</u></p> <ul style="list-style-type: none"> <li>Quarterly monitoring of boreholes (water quality and level) – for at least 5 years post-closure or until site relinquishment criteria have been achieved</li> </ul>	
Petroleum Products	<ul style="list-style-type: none"> <li>Remove oil drums and petroleum products off site for re-sale/use.</li> <li>Demolish the storage area and associated tanks in which petroleum products are stored.</li> <li>Decontaminate at dedicated decontamination bay in Karibib.</li> <li>Demolish and excavate concrete foundations to 1 m below ground level, and</li> <li>Clean up contaminated waste</li> </ul>	
Solid Waste	<ul style="list-style-type: none"> <li>Sort and screen waste produced from the dismantling and demolition of infrastructure.</li> <li>Recycle waste that can be recycled/salvaged (e.g. steel) after decontamination; and</li> <li>Dispose of inert demolition waste at the Karibib Waste Management Facility</li> </ul>	

#### 4.4 A Quick Guide on Monitoring of EMP Implementation

To support and ensure that the proposed mitigation measures are achieving the desired results throughout the project's life cycle, a monitoring plan must be implemented alongside the mitigation plan. The environmental monitoring programme will also ensure compliance to the recommended mitigation measures and best practice environmental standards. Collectively, the environmental monitoring plan/ programme will serve the following purposes:

- To establish a baseline, that is, gathering information on the basic site characteristics to establish current conditions.
- To establish long term trends in disturbed systems.
- To estimate inherent variation within the environment, which can be compared with the variation observed in another specific area.
- To make comparisons against a standard or target level.

The following monitoring tools are recommended:

- **PHOTOGRAPHS** must be used to provide evidence and verify compliance with respect to the following aspects:
  - Provision for quarry slope stabilization methods, e.g., benching, rock nails or bolts, meshing.
  - Provision for erosion control facilities onsite, e.g., silt traps, re-vegetation works on exposed areas
  - Provision for dust and noise suppression facilities, e.g., planting of trees around the quarry, condition of access roads.
  - Stockpile areas for overburden and topsoil, highlighting zones with any evidence of erosion or those requiring protection from erosion,
  - Provision of wet suppression system provided at the quarry sites, access roads or other dust encapsulation system.
  - Changes to the landscape of the area,
  - Proper waste management practice onsite, e.g. provision for waste collection bins, general site conditions at the working areas, site office, storage area, workshop, sewage facilities, and others.
  - Provision of traffic management plan.
  - Evidence for creation of new tracks due to non-compliance

Geo-referencing of photographs on a map together with GPS coordinates, as well as the date and time they were taken.

- **PERIODIC FIELD CHECKS** must be done during site preparation and operation stage of the marble quarrying and ongoing exploration activities in order to ensure compliance with the following mitigation measures:
  - Conditions of quarry slopes.
  - Validity of all operating permits such as the ECC, water abstraction permit, etc.
  - Improved working practices/ management procedures at all work sites.
  - Phased quarrying and rehabilitation progress.
  - Acceptable conditions of man-made structures such as slope protection, drainage diversion and collection systems, ablution facilities, and oil storage facility.
  - Landscaping works post progressive rehabilitation of quarry.
  - Compliance to provision of appropriate and adequate PPE.
  - Compliance to recommended safe practice such as holding daily safety meetings and conducting daily inspections on vehicles and plant.
  - Compliance to reporting of all safety, health and environmental incidences through inspection of safety books.
  - Proper waste handling at all working areas.
  - Proper transportation management.
  - Visual inspection for general cleanliness and good management practices within the site.
  - Effectiveness of dust and noise suppression systems
- **RECORDS** of marble quarry activities to ensure compliance with the following mitigation measures:
  - Record of all safety, health and environmental incidences.
  - Maintenance of erosion control facilities, e.g. drainage diversion and containment systems, gabions along steep access/ haul road shoulders;
  - Daily working hours.
  - Daily inspection logs for all vehicles and plant.
  - Records of any chance finds in so far as archaeological sites are concerned.
  - A record of any complains launched to the Proponent concerning the quarry activities.
  - Whether data records being collected for monitoring purposes are actually being utilized by the proponent to assess trends and continuously improve on the recommended impact management and mitigation measures.
- **MAPS/ LAYOUT PLANS** to indicate locations of key structures and all monitoring tools or instruments being utilized during the mine operational phase. Such layout plans should encompass the following:

- Boundary fence (if any) of the quarrying areas.
- Quarry boundary, slopes and any hazardous geological structures based on regular simple drone surveys and field inspections.
- Haul and access roads.
- Waste rock dumps.
- Drainage collection and diversion channels.
- Erosion control structures.
- As-built outline of the quarry site including all stockpile bays.
- As-built outline of all other infrastructures on site such as the mobile container office, workshop, weigh bridge, traffic sign boards.
- As-built positions for all water and air quality monitoring stations.

## **5 RECOMMENDATIONS AND CONCLUSIONS**

This Environmental Management Plan has been prepared for the proposed establishment of a small to medium scale dimension stone quarry on mining claims 72499, 72500, 72501, 72502 and 72503.

Activities such as dimension stone quarrying are crucial socio-economic development mechanisms that create employment and technical skills transfer and revenue collection for the government through taxes. The Environmental Monitoring activities shall be undertaken during the mine preconstruction, mine construction and operational stages of the proposed project.

The Proponent shall comply with the legal requirements governing this type of project and its associated activities and all the necessary environmental and social (occupational health and safety) precautions provided shall be adhered to.

Further to the above, all required permits, licenses and approvals for the proposed activities should be obtained as required. The Environmental Management Plan should be used as an on-site reference document during all phases of the proposed project, and auditing should take place in order to ensure compliance with the EMP for the proposed site.

Transgression of the EMP, should be taken as a serious offense with responsible persons held accountable for the rehabilitation that may need to be undertaken.



## APPENDIX 1: CHANCE FINDS PROCEDURE (AFTER KINAHAN, 2020)

Areas of proposed development activity are subject to heritage survey and assessment at the planning stage. These surveys are based on surface indications alone, and it is therefore possible that sites or items of heritage significance will be found during development work. The procedure set out here covers the reporting and management of such finds.

**Scope:** The “*chance finds*” procedure covers the actions to be taken from the discovery of a heritage site or item to its investigation and assessment by a trained archaeologist or other appropriately qualified person.

**Compliance:** The “chance finds” procedure is intended to ensure compliance with relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): “*a person who discovers any archaeological .... object .....must as soon as practicable report the discovery to the Council*”. The procedure of reporting set out below must be observed so that heritage remains reported to the NHC are correctly identified in the field.

### Responsibility:

<b>Operator:</b>	To exercise due caution if archaeological remains are found
<b>Foreman:</b>	To secure site and advise management timeously
<b>Superintendent</b>	To determine safe working boundary and request inspection
<b>Archaeologist</b>	To inspect, identify, advise management, and recover remains

### Procedure:

#### Action by person identifying archaeological or heritage material

- a) If operating machinery or equipment stop work
- b) Identify the site with flag tape
- c) Determine GPS position if possible
- d) Report findings to foreman

#### Action by foreman

- a) Report findings, site location and actions taken to superintendent
- b) Cease any works in immediate vicinity

Action by superintendent

- a) Visit site and determine whether work can proceed without damage to findings
- b) Determine and mark exclusion boundary
- c) Site location and details to be added to project GIS for field confirmation by archaeologist

Action by Archaeologist

- a) Inspect site and confirm addition to project GIS
- b) Advise NHC and request written permission to remove findings from work area
- c) Recovery, packaging and labelling of findings for transfer to National Museum

In the event of discovering human remains

- a) Actions as above
- b) Field inspection by archaeologist to confirm that remains are human
- c) Advise and liaise with NHC and Police
- d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.